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ABSTRACT

In 1991-1992, the Massachusetts Institute of Technology (MIT) Libraries conducted an Information Services Study with support from the Office of the Provost. Its purpose was to study how faculty, research staff, and students in three disciplines on campus gather information for their work. Members of the departments of Brain and Cognitive Sciences, Management Science in the Sloan School of Management, and Materials Science and Engineering were asked about the information sources they use and their methods of discovering these. The staff assigned to the study were then expected to formulate preliminary recommendations for library and information services based on the findings. This report contains the summary of responses to the questionnaire, themes, recommendations for services, and suggestions for further research. Included in the appendices are the organization of the study; a list of sources, including annotated bibliographies of sources consulted for instrument development and sources for alternative methodologies; areas for question development; data gathering instruments, including "MIT Community Survey of Information Acquisition and Usage," the interview guide, and the focus group discussion guide; and a statistical summary of the questionnaire. (Contains 82 references.) (JLB)

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ED 366 344

Information Services Study

Final Report

MIT Libraries

October, 1992

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Table of Contents

Introduction 1

Background and Impetus for the Study 1

Organization and Objectives of the Study 2

Literature Review and Related Research 4

Research Methodology 5
- Overview of Study Design and Data Collection
- Data Analysis

Findings 8
- Summary of Responses to the Questionnaire
- Themes and Recommendations

Conclusion and Suggestions for Future Research 19

Appendices
1. Organization of the Study
   - a. Organization Chart 23
   - b. Timeline for Information Services Study 24
   - c. Structure of the Study-Working Groups 25
2. Sources
   - a. Sources from ARIST 26
   - b. Sources Consulted for Instrument Development 27
   - c. Sources Most Relevant to the Study 32
   - d. Other Sources Consulted 34
   - e. Selected Sources with Alternative Methodologies 37
3. Areas for Question Development 39
4. Data Gathering Instruments
   - a. *MIT Community Survey of Information Acquisition and Usage* 43
   - b. Interview Guide 52
   - c. Focus Group Discussion Guide 57
5. Statistical Summary of the Questionnaire 63

Introduction

In 1991-1992, the MIT Libraries conducted an Information Services Study with support from the Office of the Provost. Its purpose was to study how faculty, research staff and students in three disciplines on campus gather information for their work. Members of Brain and Cognitive Sciences, Management Science in the Sloan School of Management, and Materials Science and Engineering were asked about the information sources they use and their methods of discovering these. The staff assigned to the Study were then expected to formulate preliminary recommendations for library and information services based on the Study's findings.

The Study was undertaken as academic libraries face several issues. The increasing variety of electronic resources, growing use of personal computers, the continued reliance on libraries to provide relevant collections locally and rapid access to and delivery of remote information, the burgeoning literature, its cost, the difficulties of keeping informed of new work, and the expanding role of librarians as guides through the information maze are all topics of concern in the field, and this report addresses them as well. And in light of these issues, several libraries have renewed efforts to consult their communities directly in their planning process.

The Final Report presented here describes the MIT Libraries' endeavor to do this through the Information Services Study. It presents the results and makes preliminary recommendations for strengthened library services. Librarians should continually improve their understanding of the subjects and research methods of their campus communities through studies like this in order to remain a central source for information and be utilized to their full potential. The findings discussed here provide insight to the MIT community which will assist the Libraries achieve this goal.

Background and Impetus for the Study

Although the call for a formal study of information services appears relatively recently in the Libraries' planning documents,[1] there has been a desire to do such a study for several years. One example is the suggestion made in 1973 to conduct "studies of library users at all levels, their needs, techniques, and success in locating materials."[2] Various projects in the last twenty years have had public services components, but no project focused solely on the information behavior of a group or groups within the MIT community. Studies such as the Technical Information Project, Project INTREX, NASIC and the Aga Khan Optical Disk Project explored advancing technologies in certain subject areas. Other studies, such as The Collection Analysis Project, Vivienne Lee's 1986

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[1] The MIT Libraries at the Beginning of the 21st Century - A strategic Plan. Cambridge: The Libraries, Massachusetts Institute of Technology, 1988.

[2] Joel Orlen, Chairman. Library Without Walls. A Working Paper of the Task Force on the Future of the MIT Library System: 1974-1990. December 1973, p. 50.

bachelor's thesis,[3] and the 1989 Council on Library Resources Grant[4] included surveys which gained some information directly from the community. However, the present study had a consistent focus on students and faculty at MIT in their working environments. Here the attempt was made to directly observe and discuss the methods these individuals use in gathering information for their teaching, research and learning.

The Information Services Study as it was identified in the FY1992 Update to the Strategic Plan, underwent changes from the initial mention of the concept in 1988 to its formal beginnings in August, 1991. The Strategic Plan called for such a study to include topics such as staffing, hours, and organization and levels of service. It suggested the Study identify needs of various user groups by looking at various disciplines, especially those of undergraduates and interdisciplinary researchers. Updates to the Strategic Plan provided further direction, such as the stated intention in 1989 to gather more "face to face data" using interviews and focus groups discussions, and the suggestion to include audiences such as undergraduates, graduate students, faculty, research staff, academic administrators, Information Systems staff and individuals outside the Institute. The FY1992 Update to the Plan also listed several issues which would be studied for a group of disciplines. Some of these were incorporated into the final objectives of the study.

In sum, then, this study was anticipated for some time. Other efforts provided the Libraries with various insights, but this project focused on selected members of the MIT community. The planning documents of the Libraries provided support and some direction, and as the time approached for the study to begin, other events influenced its final structure and funding. From the outset, however, a foundational goal of the Information Services Study was to gain a better understanding of the students, faculty and research staff in three disciplines at MIT, and then to use the knowledge gained to directly improve information services.

Organization and Objectives of the Study

Organization

The formal responsibility for the Information Services Study was assigned to the new Associate Director for Public Services in the FY1991 Update to the Strategic Plan. It was envisioned that a librarian would serve as a leader for the project with the involvement of other professional staff, and that the work of this group would be supported and reviewed by other administrative groups in

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[3] Vivienne Lee. Understanding Library Needs and Designing a Computerized Library System on Project Athena. Bachelor of Science Thesis, Department of Electrical Engineering and Computer Science, MIT, 1986.

[4] Candy Schwartz and Richard Hines. Library Services and the Online Campus Gateway, Final Report. Submitted to the Council on Library Resources, November, 1989.

public services. A chart depicting the structure of the Study and its place in the Libraries' organization appears in Appendix 1.

The final arrangement of staff for the Study included a half-time Assistant Librarian assigned as Project Leader who served under the Associate Director for Public Services, the Project Director. Three working groups of four or five librarians each were then formed, each being assigned to one of the three disciplines being studied. The composition of these groups included the subject selector for that discipline, one or two reference librarians from fields related to that discipline, and a librarian from outside public services.[1]

The role, responsibilities and activities envisioned for the working groups was outlined in the "Structure of the Study: Working Groups" information sheet (see Appendix 1). The groups were to assist the Project Leader in the Study's design and conduct, and provide a summary of their findings for the Final Report. The members of these groups performed these tasks without specified release time, in addition to their other responsibilities, over a ten month period.

Objectives

> "Library-related research is intended to improve effectiveness of the library, increase the degree to which the library can resolve the information needs of its clientele, and prepare itself for organizational change and adaptation to the environment."[2]

The purpose and design of the Information Services Study reflect the goals stated above. (see Appendix 1) Various research questions such as, "What methods do students, faculty and research staff use to gather information?"; "What sources are sought and used?"; "Where is information sought and found?" and "How can the Libraries serve these groups and others more effectively?" guided the Study and helped form its specific objectives. These were:

- To examine the information needs of scholars in three disciplines at MIT
- To learn how they seek, obtain, use, and transmit information and data in their instructional and research activities
- To describe changes in these methods, if any, during the past 5-10 years, especially regarding information technology

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[1] Initially, it was hoped that both a faculty member and a member of each department's research staff would serve on these study teams. However, this idea was not endorsed by the departmental representatives with whom the Project Leader and Director spoke. Instead of suggesting one or two individuals who could provide this kind of continual assistance, these administrators provided names of several individuals in their departments whom the teams consulted as the study progressed.

[2] R. Swisher and C.R. McClure. Research for Decision Making: Methods for Librarians. Chicago, IL: American Library Association, 1984, p. 15.

- To describe the Libraries' current role in these activities and make recommendations to strengthen their services

Thomas Pinelli, a librarian at NASA Langley Research Center and researcher of user communities wrote in a recent review article, "... to meet the information needs of the user communities, information professionals must first understand the nature of the user community and become familiar with the information-seeking habits and practices of the user."[3] This was the purpose with which the Information Services Study began.

Literature Review and Related Research

The topics of information seeking, needs and use account for hundreds of studies in the library and information science literature. Although a comprehensive review of these was not a goal for this Study, many articles and reports were nevertheless read and reviewed. (See Appendix 2).

A familiar starting point for the topic of information-seeking behavior is the Annual Review of Information Science and Technology. Chapters often entitled "Information Needs and Uses" summarize and criticize this literature from volume 1 in 1966 through volume 25 in 1990. For convenience, these chapters are listed separately in Appendix 2a.

In addition to consulting these reviews, several literature searches were also done on the topic in databases related to the three disciplines. These included INSPEC, ABI/Inform, Management Contents, Compendex, Psychlit, Medline, Metadex, Biosis and CA Search. The more general databases of SciSearch, Social SciSearch and NTIS were also searched topically as were ERIC, LISA and Dissertation Abstracts.

Citation searching was another approach taken. The works of Diana Crane on invisible colleges,[1] William Garvey, [2] Glass and Norwood,[3] Julie Neway[4] and Chandra Prabha[5] were searched in SciSearch and Social SciSearch for later references to them.

Just as in other reports of user studies, relevant research to this Study was also found by chance or was passed along by colleagues. Four very useful works

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[3] Thomas Pinelli. "The Information -Seeking Habits and Practices of Engineers." Science and Technology Libraries 11 (3) : 5, 1991.

[1] Diana Crane. Invisible Colleges: Diffusion of Knowledge in Scientific Communities. Chicago, IL: University of Chicago, 1972.

[2] William Garvey. Communication: The Essence of Science. New York: Pergamon, 1979.

[3] Bentley Glass and Sharon H. Norwood. "How Scientists Actually Learn of Work Important to Them" in Proceedings of the International Conference on Scientific Information. Washington, D.C. National Academy of Sciences, 1959. p. 195-197.

[4] Julie M. Neway. "The Role of the Information Specialist in Academic Research. " Online Review 6 (6): 527-535, 1982.

[5] Chandra Prabha. "Some Aspects of Citation Behavior: a Pilot Study in Business Administration." Journal of the American Society for Information Science 34 (3): 202-206, 1983.

were a recent issue of *Science and Technology Libraries*,[6] The 1991 Faxon Institute Report,[7] a paper in the 1991 ASIS proceedings,[8] and the series of three booklets produced by The Research Libraries Group on information needs assessments.[9] These all offered useful background reading as well as ideas for data collection.

The literature on information gathering is quite large and broad yet not very cumulative. It is not clear that recent studies really build on, replicate or validate some of the early "classical" work done by researchers such as Herbert Menzel, Saul Herner or Thomas Allen. Many studies have been limited to one institution, such as this Study, or to one discipline. However, it is important to bring a sense of the field's past efforts to current endeavors, even if some of the same questions are being asked. The review of the studies listed in the appendices provided the Project Leader and study teams with relevant background and awareness of current research, both of which assisted the Study's formation.

Research Methodology

Although The Information Services Study had been in the Libraries' plans, it did not begin with a preset design or prechosen methods of data collection. The disciplines of Brain and Cognitive Sciences, Management and Materials Science and Engineering had been selected, and plans suggested that data be gathered more directly from these groups. However, the specific staffing arrangement, structure and methodology was formed once the Study began.

An advantage to this approach was its flexibility; a disadvantage was the time consumed in study design. The difficulties the Leader and teams had in forming the study provided some experience, but slowed the Study's progress, especially delaying the involvement of consultants.

Overview of Study Design and Data Collection

The purposes of the Study naturally suggested two major phases to the project. One was the collection of data from and about the groups being studied and the second was the analysis and review of the data in order to make

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[6] Information Seeking and Communicating Behavior of Scientists and Engineers. Issued as Science and Technology Libraries 11 (3), Spring, 1991.

[7] Eric Almquist. An Examination of Work-Related Information Acquisition and Usage among Scientific, Technical and Medical Fields. Presented at the 1991 Faxon Institute Annual Conference, Creating User Pathways to Electronic Information. Reston, VA, April, 1991.

[8] Philip Doty, et al. "Scientific Norms and The Use of Electronic Research Networks." in Proceedings of the American Society for Information Science Annual Conference, Washington, D.C., October 27-31, 1991, Volume 28, p. 24-38.

[9] Constance C. Gould. Information Needs in The Humanities: An Assessment (1988), Information Needs in the Sciences: An Assessment (1990), Information Needs in The Social Sciences: An Assessment (1989). Prepared for the Program for Research Information Management of The Research Libraries Group. Mountain View, CA: Research Libraries Group.

recommendations. What was unclear, and later proved to be a fairly large issue, was whether to allow each study team to design its own strategies for data collection, or to insist these be uniform in each group across the Study. Furthermore, although it seemed a sound idea to ask the academic department heads which data collection techniques they thought would be successful in their departments, the variety of their answers clouded the issue. After much debate and preliminary conversations with possible outside consultants, the decision was made to employ four basic techniques throughout the three groups. These were:

- Focus group discussions with students in each department
- A written questionnaire to members of all three departments
- Structured personal interviews with approximately ten faculty or research staff in each department
- Review of collected data and study findings by department heads and/or staff in some manner.

Figure 1 represents a plan for the study.

Once these components were planned, the teams and the entire group then created a list entitled "Areas for Question Development." (See Appendix 3). The two consultants were then formally approached and began their involvements. Mr. Walter Harris of Opinion Dynamics, Kendall Square, Cambridge, Massachusetts was engaged to create a Focus Group Discussion Guide, lead one such group, and introduce the method to the Study teams. Other assistance was offered and accepted from Michael A. Rappa, Assistant Professor of Management Sciences, MIT's Sloan School of Management. Professor Rappa advised on the structure of the Study to some extent, but primarily assisted in the design of the questionnaire and analysis of the data. There was one additional instrument in the Study, an interview guide, which was written by the Project Leader and used in the interviews. (See Appendix 4b).

Data Analysis

The table below summarizes the number of participants in the activities completed to date in the Study.

Activity	Number of Participants/Respondents
Focus Group - BCS Graduate Students	7
Focus Group - Materials Group in Aero/Astro Dept.	8
Questionnaire	241
Interviews	27
	283[1]

[1] There may be some overlap here, since some discussants and/or interviewees may have also completed the questionnaire; however, not all did so.

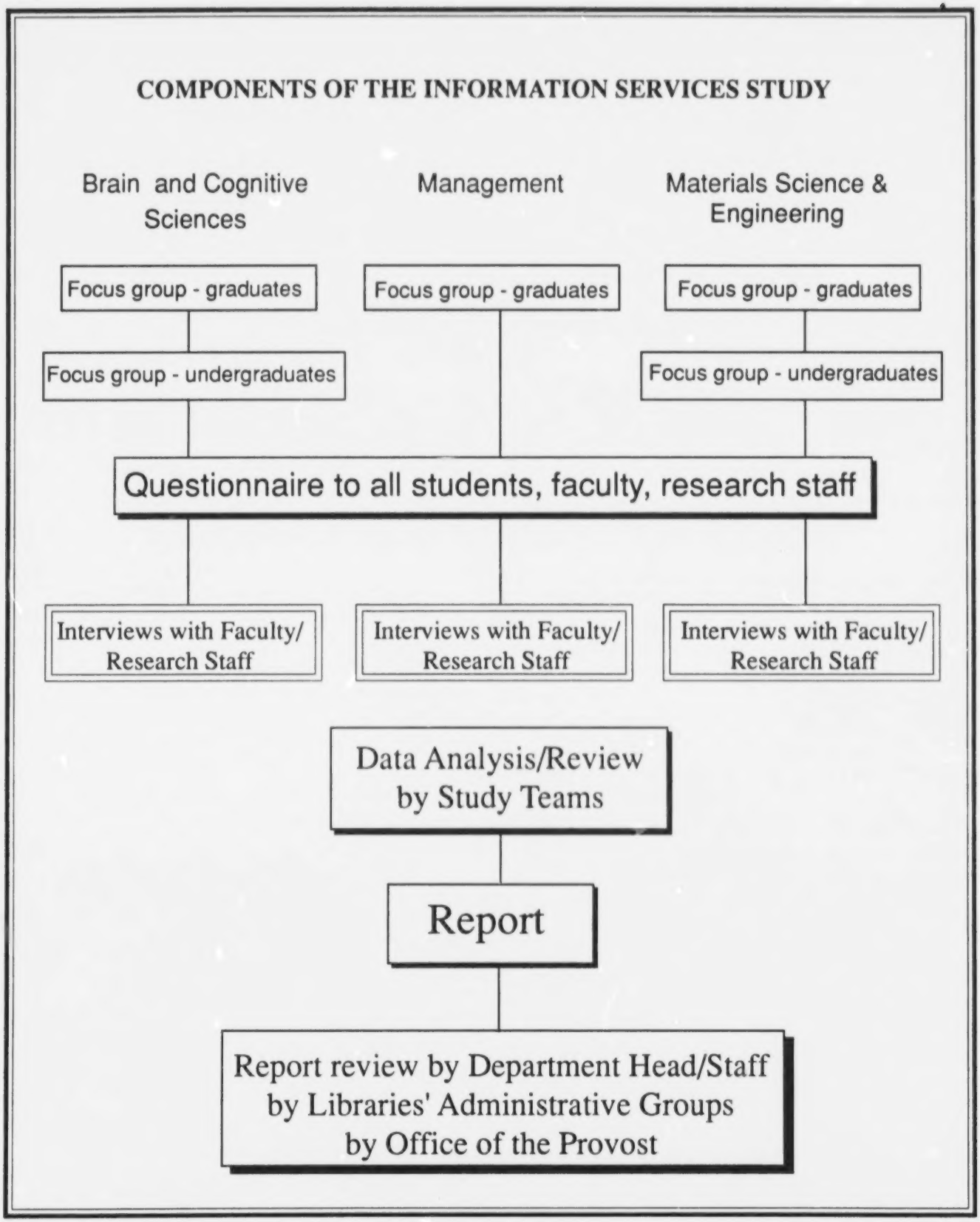
COMPONENTS OF THE INFORMATION SERVICES STUDY
Brain and Cognitive Sciences
Management
Materials Science & Engineering
Focus group - graduates
Focus group - graduates
Focus group - graduates
Focus group - undergraduates
Focus group - undergraduates
Questionnaire to all students, faculty, research staff
Interviews with Faculty/ Research Staff
Interviews with Faculty/ Research Staff
Interviews with Faculty/ Research Staff
Data Analysis/Review by Study Teams
Report
Report review by Department Head/Staff
by Libraries' Administrative Groups
by Office of the Provost

Figure 1

This data was collected in a variety of forms: videotape, audiotape, written questionnaire responses and summaries of interviews written and reviewed by the two interviewers. To ensure the best possible data, all instruments were pre-tested; focus group discussions were videotaped for review, or audiotaped with comparisons made with notes taken during the discussion; the interview summaries written by the "recorder" were checked for accuracy by the "interviewer." It was also hoped that the information exchanged and the support gained in the initial meetings with the department heads or their designates would encourage thoughtful participation.

The development of the research methodology for the Information Services Study took more time than was originally planned but involved the staff in an exploratory, applied research process.

Findings

Summary of Responses to the Questionnaire

All students, faculty and research staff in the Brain and Cognitive Sciences Department, the Sloan School of Management and the Department of Materials Science and Engineering were asked to complete a questionnaire as part of the Information Services Study. The questionnaire asked these individuals to answer a series of questions about the references they had cited in their most recently completed paper or research proposal. In particular, they were asked about those references which they were citing for the first time in their work. Among the questions asked were the total number of references used, the number of references "new" to the researcher, the types of documents these references represented, how the individual had found the references, and the locations used to obtain the documents. The questionnaire also invited respondents to attach the bibliography of the relevant paper, and a significant number did so.

Two overall observations should be made about the questionnaire before its results are summarized. The first is its overall low response rate (15.6%). This will be discussed in a relevant recommendation later in this Report. The second is that of the 241 respondents, 62% were graduate students, 23% were faculty or research staff, and 14% were undergraduates.[1]

General characteristics of papers

Table 1 given below summarizes some general characteristics of the respondents' papers. 73% of the respondents had completed papers or proposals within the past twelve months. The average number of months transpired since completion was four. Nearly half the papers had been submitted for publication or presentation, and more than one third of these had been accepted as of the day the respondent completed the survey. The papers also varied in content and

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[1] These represent response rates of 18.7% for graduate students, 15.9% for faculty/research staff and 11.4% for undergraduates.

nature. For example, 24% were experimental, 21% term papers, 14% empirical research, 11% were literature reviews and 5% were research proposals. (The complete figures for this question and all others can be found in the statistical summary of the survey, Appendix 5.)

Table 1

	B&CS	MSE	Sloan	Total
Number of respondents	42	86	109	241
Number of respondents having completed a research paper	30	55	92	177
Percent of respondents having completed a research paper	71%	64%	84%	73%
Average number of months transpired since paper was completed	5	5	3	4
Average number of co-authors (including respondent)	2.4	2.2	1.4	1.8
Percent of papers submitted for publication or presentation	85%	53%	25%	43%
Percent of submitted papers already accepted for publication	20%	63%	32%	38%

Types of sources used

The importance of journal literature is well established, and it was not surprising to find this was the most heavily cited type of source here (see Table 2). Books and chapters in edited books together accounted for 22% of sources, followed by trade journals/magazines at 11%. There was not much variation among the disciplines in types of sources used, but management made the largest use of trade journals while materials science and engineering made greater use of conference presentations. It can be seen in the full statistical summary that the average age of the first-time references was seven years. This indicates use of older materials.

Table 2

Distribution of referenced works by kind of document

	B&CS	MSE	Sloan	Total
paper in academic journal	63%	60%	34%	47%
book or monograph	13	13	20	16
trade journal or magazine	1	4	18	11
conference presentation	6	14	3	7
chapter in edited book	8	5	6	6
dissertation	3	1	4	3
technical report	5	2	3	3
working or discussion paper	0	2	4	2
government report	0	1	3	2
other	1	0	3	2
unpublished manuscript	0	0	2	1
patent disclosure	0	0	0	0
audio-visual media	0	0	0	0
	100%	100%	100%	100%

Methods of discovering references

Both established scholars and students discover work relevant to them in a variety of ways, both actively and passively. Of the references cited

here by the respondents, nearly equal numbers were found either by someone passing the reference along to the respondent (34%) or by the respondent searching specifically for literature on a subject (32%) (see Table 3). Some references (19%) were found while reading other related work, with slightly more of this occurring in Materials Science and Engineering. Across the disciplines, 10% of the references were found by chance "in the normal course of reading."

Subsequent questions on the survey provided more detail on these methods of acquiring references. For those which had been passed to the respondent by someone else, the sources were fairly evenly split between colleagues, supervisors and the authors of the works (Table 4). For references that were found by searching, some were from online databases (45%), about half as much from CD-Rom databases (23%) and slightly less (except in the case of Materials Science and Engineering) were from printed indexes (19%) (Table 5). In all of these latter cases, however, the vast majority of citations were found without librarian assistance. (Table 6). "End users" are doing much of their own searching in these disciplines.

Table 3

	B&CS	MSE	Sloan	Total
references brought to respondent's attention by someone else	40%	29%	35%	34%
references found searching specifically for literature on the subject	23	28	38	32
references found while reading other work	18	26	15	19
references found by chance, in the normal course of reading	12	11	9	10
references found while attending a conference	5	3	3	3
not sure how reference was found or other	1	2	0	1
	100%	100%	100%	100%

Table 4

Percentage of references brought to respondent's attention by someone else which came from...

	B&CS	MSE	Sloan	Total
a colleague (or fellow student)	35%	31%	26%	29%
respondent's supervisor	13	28	20	20
the author(s) of the referenced work	19	19	13	16
respondent's instructor	3	8	17	12
respondent's co-author(s)	26	6	7	11
other	0	0	16	9
respondent's research assistant	0	8	1	3
a peer reviewer	3	0	0	0
	100%	100%	100%	100%

Table 5

Percentage of references found while searching specifically for literature on the subject which were...

	B&CS	MSE	Sloan	Total
found using on-line bibliographic databases	44%	29%	52%	45%
found using cd-rom bibliographic databases	11	24	24	23
found using printed index or abstract	6	35	15	19
found using *Current Contents*	11	0	0	1
other	28	12	8	11
	100%	100%	100%	100%

Table 6

Percentage of references found while searching specifically for literature on the subject which were...

	B&CS	MSE	Sloan	Total
found without librarian assistance	78%	79%	85%	82%
found with librarian assistance	22%	21%	15%	18%

There were differences among the disciplines in references found by chance (Table 7). In BCS, most of this material belonged to the individual or was subscribed to by the department (67%). But for those in MSE and Sloan, most of this material was from the MIT Libraries (77% and 55%, respectively).

Table 7

Percentage of references found by chance which were...

	B&CS	MSE	Sloan	Total
materials respondent (or respondent's department) subscribe to	67%	23%	30%	36%
materials in the MIT Library	11	77	55	52
other	22	0	15	12
	100%	100%	100%	100%

Locations of cited references

Ninety four percent or more of the cited references were obtained for use by respondents in each of the three disciplines. As Table 8 shows, most were obtained from the MIT Libraries, with fewer in BCS using this source (37%). The other locations offered, such as the authors of the works, colleagues, non-MIT libraries or personal subscription all had meager responses. More in BCS used these latter two sources than did the others. This may reflect some of this group's use of other medical libraries in Boston.

This is a finding which might need to be considered in light of the larger response to the survey by graduate students. A breakdown by status would be useful to run for this question, as from the interviews one might not estimate the libraries would supply 50% of the references cited by faculty. Perhaps many of their references do come from the libraries, but personal collections house much

material used, and the collegial contacts of faculty provide them with documents as well as references, especially preprints and working papers. The survey indicated 31% (BCS), 19% (MSE), and 15% (Sloan) of the referenced works were by people the respondents knew. It would be interesting to see if these percentages would be higher among the faculty/research staff alone.

Table 8

Distribution of references according to how they were actually obtained by respondent:

	B&CS	MSE	Sloan	Total
from the MIT Libraries	37	62	52	52%
from the author(s) of the referenced work	10	8	7	8
from a non-MIT library	16	4	6	7
from a colleague (or fellow student)	8	7	6	7
from your supervisor	5	10	4	6
from personal (or dept.) subscription	14	4	2	5
purchase from the publisher or a bookstore	4	1	8	5
other	1	1	8	5
from your instructor	0	3	2	2
from your co-author(s)	5	1	2	2
not sure how you obtained it	0	0	2	1
a research assistant obtained it for you	0	0	0	0
	100%	100%	100%	100%

Two further observations about obtaining references or documents are in order. Although the percentage may seem high for items not owned by the Libraries (Table 9), in fact nearly all items cited were obtained. Also, there were about equal percentages reported as to when in the research process the cited items were found (Table 10). Slightly fewer were found later, but references are discovered throughout the research process.

Table 9

If not found by respondent, reasons for lack of success in obtaining referenced work:

	B&CS	MSE	Sloan	Total
not owned by the MIT Libraries	67%	50%	71%	64%
too recently published to be found in the MIT Libraries	33	0	14	14
not loaned-out, but unable to locate on shelves of MIT Libraries	0	50	0	14
already loaned-out to another library patron	0	0	14	7
	100%	100%	100%	100%

Table 10

Distribution of referenced works according to when the respondent first became aware of it...

	B&CS	MSE	Sloan	Total
during the early stages, while planning the research reported in your paper	30	38	42	39
during the middle stages, while undertaking the research reported in your paper	29	37	41	38
during the later stages, while writing your paper	41	25	17	23
	100%	100%	100%	100%

Although the response to this questionnaire did not provide a complete picture of the sources and methods scholars use to find information, it did confirm knowledge we have gained from other user studies and direct experience. The observations made below do not require recommendations as such, but they are important to highlight since they do describe our community. The Study's recommendations, which appear in the next section, build on these observations.

We may reasonably conclude from the survey the following:

• Journals are heavily used by the members of our community. It is important to maintain a strong collection of them on campus and rapid access to those not owned.

• Researchers use older as well as current materials, raising important considerations about what items to retain, acquire or store for the collections.

• Scholars learn about references relevant to their work in a variety of ways. Through collegial contacts, students and faculty exchange references and documents informally among themselves. They also search for relevant research, and sometimes they find useful material by chance.

• Significant numbers of individuals are searching online databases and CD-Rom databases, with probably fewer using printed indexes. Since many of these searches are conducted without librarian assistance, it is important that users be correctly informed of the scope and search methods for these resources.

• Scholars use both personal collections and libraries to locate specific materials and, to some extent, browse. To what extent are the Libraries' materials arranged in ways that facilitate these two quite different activities?

• While our studies can improve our understanding of information-gathering behavior, much is still unknown. Users and non-users remain somewhat "elusive."

Themes and Recommendations

One of the fundamental goals of the Information Services Study was to begin to address the question "How can the MIT Libraries serve these three groups, and subsequently others, more effectively?". The responses to the questionnaire provided a general understanding of the types of sources and methods used by some individuals at the Institute, and confirmed some of our own previous knowledge. Two of the other components in the Study, the group discussions and personal interviews, provided more details on these topics, and several persistent themes emerged. The following recommendations are derived from all of these data.

Theme 1: Information and Access Available in and Delivered to the Office or Workstation

"Having information near and usable is much more important than perfect data at a distance."

-Professor, Materials Science and Engineering

While the use and possession of computers, software and peripherals varies in and among the three disciplines, many of those interviewed stressed the importance of convenient access to information. Several defined this as being in the office, online, and/or over the network. Information and services delivered at these points are more likely to be used than those which require separate, distinct trips to a "remote" library, defined by some as anything not down the same corridor. The examples interviewees gave of desired online services included bibliographic databases on the network, tables of contents, abstracts, the MIT Libraries' catalog, CD-Rom databases and full texts of journals on the network or Internet. Another frequent request was for the ability to not only mark or retrieve items, but also to procure hard copies in the office, either printed out there or sent.

Recommendation: The MIT Libraries should continue and intensify efforts to mount electronic resources on the campus network and provide support for electronic access by individuals to those not mounted locally. The emphasis should be on providing access to bibliographic data, with selected non-bibliographic resources evaluated and prioritized. This access should be accompanied by education and consultation services, especially since a large number of individuals are searching such resources without librarian assistance. One possibility is to consider providing these services to users by a combination of the Libraries' public services and information systems staff.

Theme 2: Notification of Recent Literature is Desired by Many
Question: "What do you do to keep up with developments in your field?"
Answer(s): "Too little." "It's just about impossible." "I'm not sure I want to keep up. There's a vast amount out there." "I don't bother. You can read others or write your own. I write my own."
- Faculty in Management Science and Brain and Cognitive Sciences

Each of the study teams' summary reports included a recommendation for some kind of table of contents service or system. Some individuals have tried Current Contents in its various forms, others have had tables of contents of journals routed to them, others browse in the library. Some want the ability to select a limited number of specific titles, others would not object to a searching system if it was better designed and had more refined content. Nearly all who discussed this desired a document delivery component with the service. While individuals attempt to learn about what is newly published to greater or lesser degrees and do so in various ways, exploring the feasibility of such a service would be a way to try to measure demand and answer a need.

Recommendation: The MIT Libraries should provide tables of contents information to faculty, perhaps initially on an experimental basis. This would require a review of the printed and electronic services which now offer this (e.g. vendors such as ISI, CARL/Uncover, Dialog); staff requirements in time and expertise; feasibility of a manual approach; any such services now offered by departments or branch or other libraries at MIT; document delivery options and the technical support required for this. A review of such a trial project would assist in the assessment needed for any larger scale effort.

Related to the recommendation above, each report also suggested that a current awareness/SDI (selective dissemination of information) service be explored and/or offered. Since such profiles are now possible to request, perhaps it is necessary to explore options which provide refined searches with more convenience and less cost to the user than are offered presently.

Recommendation: The MIT Libraries should review the use now made of SDI services by researchers both through the Libraries and other avenues. Alternative approaches to present promotion, pricing, set-up and delivery of such information (including full text) should be tried as an experimental project. This kind of delivery of current information should then be contrasted with what is learned from the tables of contents trial in order to refine one or both systems for service to the community.

Theme 3: In virtually any service, either currently offered or proposed, rapid document delivery is quickly mentioned as a key component. Its presence or absence often determines use made of the service or of the information itself.

"I have a great set of yellow pages, but I can't complete the call."
- Professor in Materials Science and Engineering

The previous recommendations mention that information made available online, tables of contents services or current awareness services all should be explored with a document delivery component as part of the package. A professor made the remark quoted above while describing what it was like to identify relevant citations and then not find them on campus. He, and others, use the Libraries' Interlibrary Borrowing Service, but they also find alternate, faster means when they need the material quickly. Many interviewees described that such delivery of information to their offices would be a large asset to their work.

Recommendation: The Libraries should continue to investigate and evaluate the document delivery systems available commercially and within existing library networks. Efforts to create a rapid delivery system among the libraries in Boston, the Boston Library Consortium, Harvard and Countway should continue, with the design and trial of a rapid and more complete working system as the goal.

Theme 4: Because the amount of information continues to grow and the avenues of access to it expand, librarians should exercise a role as guides for users to the resources they desire.

"Access to information is only as good as the tools you use."
- Research Scientist, Brain and Cognitive Sciences

The idea of a librarian serving as a guide to the array of information sources was in each team's report expressed in different ways. It is not a new idea; twenty years ago Maurice B. Line offered the following as a conclusion to the well known INFROSS project in Great Britain

"All of these considerations seem to point in one direction: the deliberate development of informal, personal services, exploiting on the user's behalf the formal services which can then be developed to any level of complexity."[2]

The report from Management described a type of information consultant, and recommended librarians and faculty regularly meet to discuss information resources and strategies. Brain and Cognitive Sciences reported the desire for "informed gatekeepers who can control and direct the flow of information" along with customized and filtered information for users. The Materials Science and Engineering report actually recommended the development of a model for a "personal information guide" and described the issues this would have to address.

A previous recommendation suggests that the services and resources individuals use are those close, convenient and easy to use. One aspect to this might be geographic distance and delivery of information, but another must be knowing about such resources in the first place. It would seem that scholars

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[2] Maurice B. Line, "Information needs of the Social Sciences," INSPEL 8 (2) : 36, 1973.

could choose to avail themselves to any of several sources and be assisted in their information-gathering if information about such resources was provided to them as they wish it - conveniently, directly and personally.

Recommendation: The MIT Libraries should examine the kinds of in-depth personal (off the reference desk) assistance their staff are currently providing to users in terms of scope, level of expertise and staff time. Special note should be made of any help being provided for electronic resources, communications software, programming or other computer support. A range of topics and the types of assistance staff should provide should then be outlined for such a "consultancy" service, with decisions made as to the appropriate staff, the means of provision and the sources of time for staffing.

Recommendation: Given the importance and use of personal collections, one type of assistance which can be explored is that of providing expertise in bibliographic file management software. Some individuals at MIT already use various packages, including Endnote, Reference Manager, Endnote Plus and Reference Update. Perhaps some staff should learn these and be able to help users choose and implement one or more of the best packages available.

Theme 5: Librarians can increase the efforts expended in instructional services to the community with more attention to at least one or two groups.

"[I would like] informed people to help you help yourself."
- Post Doctoral Fellow, Brain & Cognitive Sciences

Although also expressed differently in each group's report, each contained the suggestion for additional instructional support for, interestingly, three different groups. The Management team identified those individuals to whom tasks of information gathering are delegated. Often these are secretaries or research assistants, and their report suggested the Libraries provide further assistance to them. The delegation of information searching and collecting occurs in the other two disciplines as well, and surely to some extent all over campus. Graduate students studying materials in the Aeronautics/Astronautics Department described tasks they had been given by faculty and in turn, ones they had given to undergraduates. The amount and levels of delegation will vary, but perhaps more can be learned about its nature and then relevant instruction offered.

The Brain and Cognitive Sciences report did not specifically call for instruction to be offered although the need for this for undergraduates was discussed in the focus group. The report did mention a possible role for librarians, especially with graduate students, as "something akin to air-traffic controllers for networked information." This assistance could be provided by either consulting with individuals or small groups or conducting discipline specific seminars.

The Materials Science and Engineering report made the clearest suggestion for instruction in these actual terms. It recommended these efforts be strengthened in this area along with ensuring strong collections in order to support the teaching functions of the department.

In the future, other kinds of instruction may be necessary as databases, "gateways" and other resources are made available on the network and in other ways. This wider scale effort would need coordination and staffing.

Recommendation: Because the responsibility for instruction is currently spread among individuals and committees in the Libraries' structure, a review of ongoing instructional efforts system wide should be made (or updated, if one has been recently completed). Special note should be made of any efforts currently expended to the groups mentioned above. A draft of these efforts, with any current plans for new instruction, should be reviewed by the Associate Director for Public Services, with the goal of determining other areas in which instructional support would be useful. Careful consideration should then be given as to the kinds of instruction which evolve independently and those efforts which need system-wide coordination, either due to audience or scope. For these latter cases, assigning the responsibilities to one or at most two individuals should be considered.

Theme 6: The MIT community can benefit from being more fully informed of the Libraries' services.

"[I have not explored the Libraries' services adequately]."
-Professor, Materials Science and Engineering

It was clear from all the reports that students and faculty are unaware of several of the Libraries' current services and new initiatives. Some persons interviewed mentioned their own lack of information, some regretted this, and some admitted this "was their own fault." Some students thought they knew about services, but when they described these their information was partial or incorrect. One or two faculty wished for a communication tool by which new information from the Libraries could be dispersed.

It is appropriate here to briefly discuss the low response rate to the Study's questionnaire because it further prompts the following recommendation. There is always a variety of reasons for non responses to surveys, and in this case the timing (the end of April), the length, and people's personal dislike of surveys all can and have been considered. However, these reasons notwithstanding, an overall response of less than 16% is very low, especially for a local study. While it was suggested that the inclusion of undergraduates in the distribution, especially given the timing, could have lowered the response rate even further, the return rates for faculty and graduate students were still 16% and 19% respectively. Rates for each department were also low (BCS 18%, Sloan 12%, MSE 23%).

The questionnaire for this Study was not about the MIT Libraries, but rather the recent research of individuals on campus. It seems that in several cases, assumptions were made about the content of the questionnaire and decisions were made to ignore it. Some, including those on the study teams, have suggested this was due in part to its identification with the Libraries. While this can not be known fully, observations of a lack of information about the Libraries and a low response from the community remain.

Recommendation: The MIT Libraries should continue and strengthen their outreach efforts to inform the community about their roles, plans, and services. Additional means to accomplish this should be sought and tried. A range of publications exist - perhaps distribution of these (such as to new faculty with personal follow-up) should be reviewed. Information also exists on Athena - perhaps this is not widely known or instructions for access can be improved. In sum, the Libraries should review the information they desire the community to know about themselves, and try to improve distribution of this.

Conclusion and Suggestions for Future Research

The Information Services Study accomplished several purposes for both the MIT Libraries' staff and the Institute community. Throughout the process the study teams learned more about how researchers in three disciplines on campus gather information. They were able to reaffirm the importance of scholars' personal collections, collegial contacts, and reliance on journals, preprints or in some cases conference proceedings or abstracts. They found that while books and browsing are important to some, other researchers do not use the Libraries at all. And many individuals emphasized the importance of close, convenient access to information and documents.

The participants in the Study, especially those interviewed, learned about the Libraries' interest in serving them and often more details of current services. From their participation, several themes and recommendations emerged covering issues such as electronic access, provision of current bibliographic information, delivery of documents and greater consultation, instruction, and outreach.

The Study also led librarians through a research process, from the formulation of research questions and methodology to synthesis and proposal of recommendations. This is a useful opportunity which many librarians elsewhere do not take or do not have available.

This Information Services Study has left several topics open for future research. Other disciplines can be studied and contrasted with those done here. Although this Study included faculty, research staff, and students, more can be learned about each of these groups, especially the undergraduates. They should be highly considered for a similar study. In retrospect, the Study's objective of assessing changes in instruction and research seems particularly broad. Some impressions of this were gained, but this topic is really another study itself. Finally, several of the proposed

recommendations are exploratory in nature, suggesting future work in these areas as well.

This past May, Doris Schlichter and J. Michael Pemberton suggested that academic libraries have neglected user needs and that many "user studies" are merely 'descriptive snapshots' of the present and do not include a view of their own use in future planning. They identified difficulties in the design of these studies, such as tendencies to be "library oriented" or to meet pre-set agendas. They suggested that surveys often overlook non-users and student opinions.[1]

This Study, however, did attempt to elicit information directly from members of the academic community. It was designed to, and will, play a role in future planning. It was not "library oriented" in its aim, and it tried to solicit participation from as many individuals in the three disciplines as possible. The answers the participants gave and the information staff gained will shape the direction of the Libraries' public services in the next few years to come.

No study such as this is complete without some evaluative comment on the process of conducting it. Those on the three study teams offered the following observations on the Study.

Organization and Structure

- While the size of teams seemed right, some tasks attempted by the large group (13) were made more difficult because of the size. Suggestions to improve this included fewer members overall but with release time; a research assistant for the leader for clerical and administrative support; better use of "conveners" of the three teams; formation of planning and implementation groups.

- While study of three disciplines allowed collection of comparative data, it may be too many to do simultaneously. Although one discipline here was Management, this involved an entire School at MIT.

- Despite best efforts, the Study required more time than was anticipated. More time was needed to interview faculty, conduct discussions with students and write and analyze.

Methodology

- While some staff saw value in the "organic nature" of the process, others felt that a pre-set methodology would have been better than struggling to determine this as the Study progressed. Certainly the time needed to devise the methods was underestimated. Greater focus on this earlier,

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[1] Doris J. Schlichter and J. Michael Pemberton. "The Emperor's New Clothes? Problems of the User Survey as a Planning Tool in Academic Libraries," College and Research Libraries 53(3) : 257-265, 1992.

perhaps with more direct assistance from consultants, could have moved the Study ahead earlier.

• It was unclear for some time how the data would be collected in the groups and across them to ensure coherence. Some felt that choosing three techniques across all groups produced a "watered down" product.

• Some felt the hours spent on the "Areas for Question Development" were not justified, and had others developed the survey and interview guide, more or better questions may have been posed.

Data Gathering and Results

• Focus groups are useful, but recruitment is expensive and time consuming. It might be more cost effective to contract this entire process out. While there is mixed opinion on the advantages of using a librarian as a focus group leader, most appreciated "an outsider" doing this.

• Interviews were enjoyable, increased the Libraries' visibility and yielded valuable information. More should have been held, perhaps prior to distribution of the questionnaire.

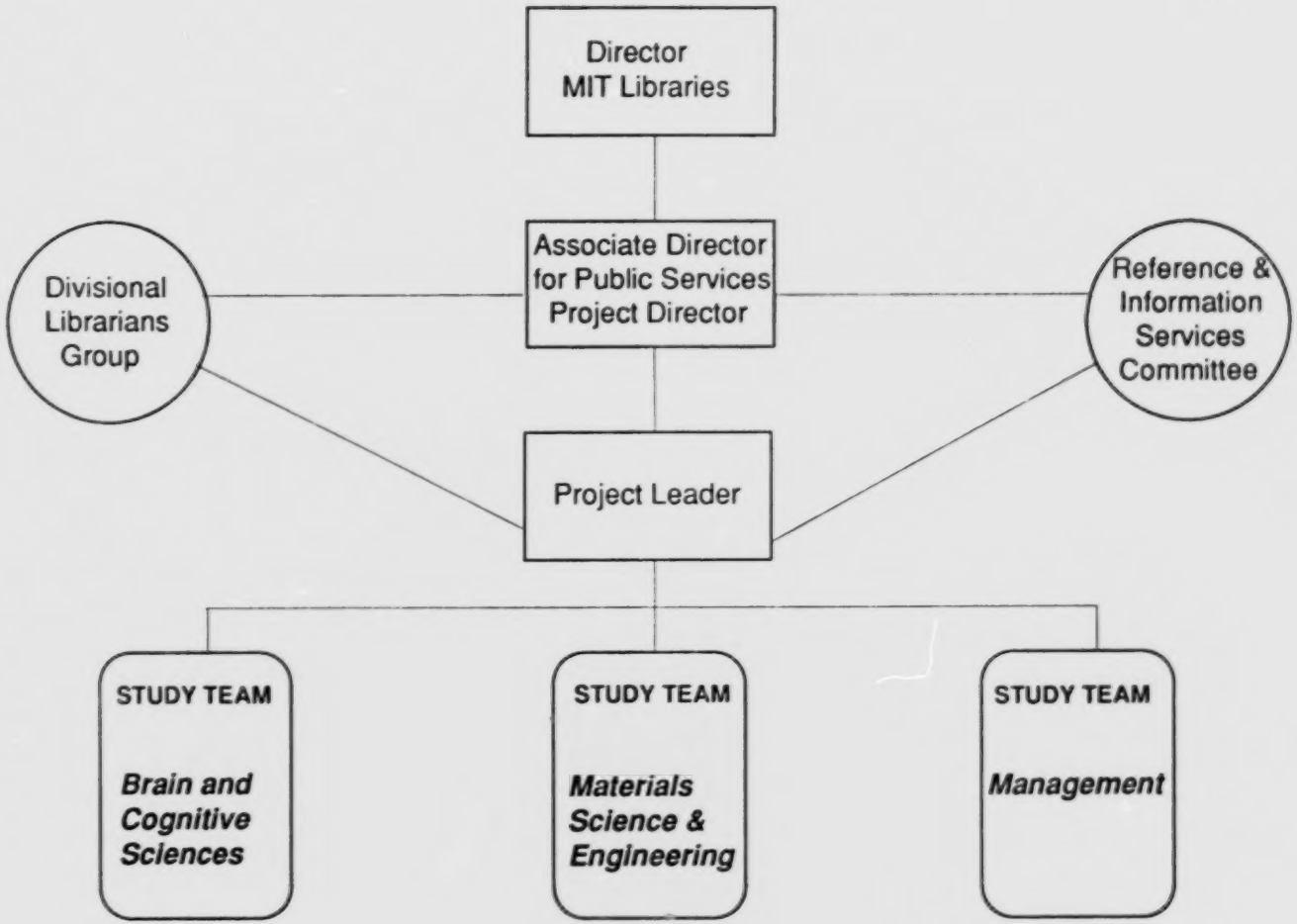
• Opinion was mixed on the effectiveness of the questionnaire. Its response rate was disappointingly low. Some felt its approach was too demanding, others felt it was too narrow. All agreed that its identification with MIT Libraries on the cover decreased response rate.

• Although efforts were made to reach students, the undergraduate population was not adequately addressed.

Appendices

Appendix 1a

ORGANIZATION CHART FOR THE INFORMATION SERVICES STUDY



Appendix 1b

Timeline for Information Services Study

Phase I Introduction, plannning and preparation/ October-November 1991

Complete Study document
Update environmental analysis
Conduct literature search
Form and charge Working Groups
PSL meeting
Presentation to Academic council
Articles in Tech, Tech Talk, MIT Report, Library Notes, etc.
Inventory/description of public services and initiatives underway
Prepare informational packet on libraries
Visits/confirmations with depts.
Begin gathering background on depts.

Phase II Information Gathering 15 Nov. 1991-28 Feb. 1992

Working groups review study documents
Review results of literature review
Gather background info on depts.
WGs choose methodologies
Assist in survey design
Attend relevant IAP activities
Consider final report formats
Conduct survey(s)

Phase III Analysis 15 February-31 March 1992

Digest, analyze, finish gathering info
WG interim reports
Interim report to Faculty Library Comm.

Phase IV Writing April-June 1992

Working Groups final reports
Information Services Study Final Report

Post Study
Presentations, publications

Appendix 1c

Structure of the Study-Working Groups

The Information Services Study proposes to look at three disciplines at MIT. In order to carry out the study, it will be necessary to form working groups to assist the Project Leader and the Project Director on a day-to-day basis. A description of these groups is provided below.

Role

The role of the working groups is to assist the Project Leader in conducting the Study by working directly with members of one of the academic departments being studied, i.e. the faculty, research staff, and students in that department.

Responsibilities

- To conduct a study of the information gathering patterns and the uses made of information in one of the disciplines.
- To write an interim and final report summarizing its findings
- To describe the present role of the library in serving these scientists, and to suggest preliminary recommendations for improved library services to them.

Activities

The activities of the working groups will include:

- Review the documentation for the Study, including the literature search to be conducted, the issues to be addressed, etc.
- Gather relevant background on the department, becoming familiar with its members, organization, research units and interests, curriculum, demographics
- Consult appropriate members of the department during the Study
- Design a methodology with the Leader and Director for gathering data
- Assist in survey design
- Write preliminary and final reports summarizing findings

Composition of the working groups

The following positions are suggested for inclusion in each group:

1. Subject Selector
2. Reference Librarian from relevant Divisional Library
3. Faculty member from department
4. Research staff member from department
5. Librarian from outside public services

Appendix 2a

Sources from ARIST

Menzel, Herbert, 1966. Information Needs and Uses in Science and Technology. In : Cuadra, Carlos A., ed. Annual Review of Information Science and Technology, ARIST, Volume 1. New York, NY: John Wiley & Sons, 1966, p.41-69.

Herner, Saul and Herner, Mary. 1967. Information Needs and Uses in Science and Technology. In: Cuadra, Carlos A., ed. ARIST, Volume 2. New York, NY: John Wiley & Sons, 1967. p.1-34.

Paisley, William. 1968. Information Needs and Uses. In: Cuadra, Carlos A., ed. ARIST, Volume 3. Chicago, IL: Encyclopedia Britannica, 1968, p. 1-30.

Allen, Thomas. 1969. Information Needs and Uses. In: Cuadra, Carlos A., ed. ARIST, Volume 4. Chicago, IL: Encyclopedia Britannica, 1969, p. 3-29.

Crane, Diana. 1971. Information Needs and Uses. In: Cuadra, Carlos A. ed. ARIST, Volume 6. Chicago, IL: Encyclopedia Britannica, 1971, p. 3-29.

Martyn, John. 1974. Information Needs and Uses. In: Cuadra, Carlos A., ed. ARIST, Volume 9. Washington, D.C.: American Society for Information Science, 1974, p. 2-23.

Crawford, Susan. 1978. Information Needs and Uses. In: Williams, Martha E., ed. ARIST, Volume 13. Chicago, IL: Knowledge Industry Publications, Inc., 1978, p. 61-81.

Dervin, Brenda and Nilan, Michael. 1986. Information Needs and Uses. In: Williams, Martha E., ed. ARIST, Volume 21. White Plains, NY: Knowledge Industry Publications, Inc., 1986, p. 3-33.

Hewins, Elizabeth. 1990. Information Need and Use Studies. In: Williams, Martha E., ed. ARIST, Volume 25. insert place, insert publisher, 1990, p. 145-172.

Appendix 2b

Sources Consulted for Instrument Development
Bibliography for written questionnaire

Glass, Bentley and Norwood, Sharon H. "How Scientists Actually Learn of Work Important to Them," in Proceedings of the International Conference on Scientific Information, Washington: National Academy of Sciences, 1959, p. 195-197.

In this pilot study, the authors interviewed 50 scientists and asked each to choose a "recent, significant paper" from his or her own publications, and then asked each to choose up to 5 or 6 items "representing scientific concepts and research of major or crucial significance to the development of (his) own work reported in the chosen paper." The two questions then asked were: 1) "How did you first learn of the existence of the work reported in each of the selected items"? and 2) "Would it have made any significant difference to the progress of your own work had you learned of it sooner than you did"? The results were: 23% of the cited works had been learned about via casual conversation; 22% from journals regularly scanned; 8.4% journals subscribed to; 6.9% cross citation in another paper, etc.

Prabha, Chandra. "Some aspects of citation behavior: a pilot study in business administration," Journal of the American Society for Information Science, 34 (3): 202-206, 1983.

This author gave each of 19 faculty in his Department of Business Administration, College of Commerce a questionnaire together with one of his bibliographies from a recent paper (within the last 2 years). He also gave them follow up interviews. The objectives of his study were to determine if the cited work had been read or scanned, the extent of use of that document, the author's perceived importance of that cite, and where the source was located. Results showed 96% of cites had been consulted by authors, but only 63% had been consulted specifically for these written articles. Less than one third were considered of critical importance, and of these 68% were in personal collections and 25% were obtained from some library. 57% overall were contained in personal collections.

Soper, Mary Ellen. "The Relationship between Personal Collections and the Selection of Cited References." Ph.D. dissertation, University of Illinois at Champaign-Urbana, 1972.

Soper, Mary Ellen. "Characteristics and use of personal collections," Library Quarterly, 46 (4): 397-415; 1983.

This article discussed the work done for her Ph.D. listed above. She selected 11 source journals from science, social science and humanities, and then selected works done by lone authors. She asked these authors where their cited works were located (personal collection; colleague's collection; office collection;

dept. library; main institutional library, etc.) and then "form of reference when cited" (originally published or distributed form; reproduction; reprint, etc.). She also asked for estimates on personal collections-size and scope. Results were 59% of cited works were in personal collections; 25% from dept or main library; 0.2% didn't remember, etc. (response rate was about 60%).

Swigger, Keith. "What Librarians Need to Know: A Study of scholars' Access to the Documents They Cite" (A report on research supported by OCLC, Inc.). Presented at the AMIGOS Fall Meeting, November 14, 1991.

This investigator tried to address three questions: 1. Where do scholars get the documents they cite in the publications? 2. Are the documents scholars use available in their local library collections? and 3. How do scholars identify documents that might be useful in their research? His research method was to identify articles published in 1989 and written by authors affiliated with a local consortium. By mail questionnaire, he asked the authors how they acquired the cited documents. Authors were also asked how they normally identified and acquired potentially useful documents. Finally, the holdings of the consortium were checked to see if authors could have found the cited items in their libraries.

About 55% of the sample of 350 authors and 213 co-authors responded to the questionnaire. Academic disciplines were represented as follows: 15% social sciences, 40% natural sciences, 35% health sciences, 6% math/computer science, 3% humanities. The most frequently reported sources of documents were: scholar's local academic library (39%), personal copies (24.5%), co-author (11%), self citation (7.7%), reprint (5.3%), cannot recall (3.2%), ILL (1.6).

A few other salient points: the author points out that this study was of published authors; in response to "typical" ways of identification of useful sources, respondents ranked citations in documents they read and consulting personal collections as first and second; "usual sources of documents were 1) borrowing or photocopying from library collections and 2) read in libraries; the authors tries to compute a ratio of actual to potential use based on the holdings of the libraries, which he claims is 46%; and he found that 85 out of the nearly 180 respondents had made the errors in their recall, saying they had gotten articles from libraries but the libraries were then found not to have the journals.

Urquhart, D.J. "Physics Abstracting-Use and Users," Journal of Documentation 21 (2): 113-121; 1963.

In this study, a survey was made of the sources of references for materials requested from the National Lending Library for Science and Technology. People who asked for documents and received them were asked where they obtained the reference ("origin of reference to publication": choices were abstracting/indexing publication; review publication; periodical article; non-periodical publication; private library or index; verbal recommendation). If the person used an abstract, he was asked to name which one, and where he/she consulted it. Persons were also asked "would you still have requested the publication supplied to you if you had seen a fuller summary in the first place?" (People for whom requests could not be filled were given a revised survey). Results were 43% requests from abstracting journals; 25% periodical articles; 14% non-periodical publications; 9% private library or index; 9% verbal recommendation.

Van Styvendaele, J.H. "University Scientists as Seekers of Information: sources of references to periodical literature." Journal of Librarianship 9 (4): 270-277; 1977.

This study of the faculty and doctoral students at the Antwerp State University Centre Library ranged over one year and each time one of these users received periodical literature from library borrowings and interlibrary loans, they were given a list of sources and asked to indicate from which the reference to the periodical article was obtained. Their question was "How did you become aware of the existence of the article which the library has provided for you?" Results were: 54% from citations at the end of articles in periodicals and books; 21.1% were results of Current Contents or other SDI's; 15.3% from abstracting/indexing journals; and the 9.3% remaining were from personal recommendations, computerized information services, theses, etc. (library browsing yielded 5% of the references).

Bibliography for interview guide, including "critical incidence" questions

Guest, Susan S. "The Use of Bibliographic Tools by Humanities Faculty at the State University of New York at Albany," Reference Librarian 18: 157-172; 1987.

The written questionnaire this author used with this group included a section which asked respondents to describe their most recent research project. A series of questions followed which asked for the expected outcome of research; relative importance of the library opposed to other sources; need for currency in pursuit of research interests; the importance of specific information sources used 1) used in research and 2) for staying current in the field, and questions on browsing and chance findings of information.

Herner, Saul. "The Information-Gathering Habits of American Medical Scientists," in Proceedings of the International Conference on Scientific Information. Washington, D.C.: National Academy of Sciences, 1959, p. 277-285.

In this study, 500 American medical scientists in 59 medical research institutions and organizations (in New York, Philadelphia, Baltimore, Washington, Chicago and Cleveland) were interviewed in person. They were asked how they kept abreast of current scientific developments in their field; where they got the idea for a recent project; and 2 or 3 questions about literature searches. Each was also asked to describe a recent instance in which "he had a problem or question that he was not able to answer from his own immediate knowledge or background," and how he or she went about finding an answer. They were asked to describe the most recent problem or question that involved a literature search and how the search was done. Finally, the scientists were also given a list of bibliographic tools or techniques and asked to state which they had used in the last six months. Results confirmed the significant role of personal contacts in getting information, but also showed that cited references and indexes were very important.

Kremer, Jeanette. "Information Flow Among Engineers in a Design Company." Doctoral Dissertation. Urbana, Graduate School of Library Science, University of Illinois, 1979. (Questionnaire reprinted in Martyn, John and F.W. Lancaster, Investigative Methods in Library and Information Science: An Introduction. Arlington, VA: Information Resources Press, 1981.)

A portion of this written questionnaire asked respondents to identify the last time they needed an "item of technical or scientific information": when this was; what was needed and why; how they searched for the information; where they searched, and what they found. Respondents were asked to similarly recount the last time they received information by chance.

Menzel, Henry. Formal and Informal Satisfaction of the Information Requirements of Chemists. Columbia University, Bureau of Applied Social Research. Sponsored by the National Science Foundation through grant NSF-GN-185. Final Report June 1970.

In this study, Menzel interviewed 161 polymer chemists from a mix of 36 government, university, industrial and independent research labs of large and small size and either "prime centers" of polymer research, places near such a center or places remote from such a center. Menzel says the bulk of the time was spent obtaining detailed accounts of "encounters" scientists had with information. Each was asked to give an account of the last times they searched for "procedural," "findings," and "theoretical" information using "routine (and then) nonroutine" channels. They were asked about the last time they "brushed up" in an area; about when they found information accidentally, and about a time when they received useful information too late. "Routine" channels included published literature, available bibliographic tools, and persons or organizations whose official responsibility included making information available to people (e.g. libraries), and immediate colleagues. Other sources were "nonroutine."

National Library of Medicine. Use of the Critical Incident Technique to Evaluate the Impact of MEDLINE. Sandra R. Wilson, author. Final Report September 30, 1989. PB90-142322. Performing organization, American Institutes for Research.

This study looked at 1158 MEDLINE searches done by 545 end users. These people were telephoned and asked: what situation led them to do a search; what were they seeking; how did they carry out the search; what information did they obtain. The end users, in essence, reconstructed their searches and the information need which led to them.

Salasin, John. "Information-Seeking Behavior in an Applied Research/Service Setting. Journal of the American Society for Information Science 36 (2): 94-102; 1985.

In this study, 1666 rural mental health workers were mailed a survey which asked for the date of their most recent "information-seeking episode" the date of the ISE; the topic(s) of the question; the sources used; and the utility of

each source. An "ISE" was defined as obtaining information from outside the organization to help solve a problem. The average ISE had 3.2 topics and used 5.0 sources.

Sievert, Donald and Sievert, Mary Ellen. "Philosophical Research: Report from the Field" in Humanists at Work: papers presented at a symposium held at the University of Illinois at Chicago on April 27-28, 1989. Chicago: University Library, University of Illinois at Chicago, 1989, p. 79-94.

At the time of this paper, these authors had interviewed 27 philosophers in offices, homes and hotel rooms. They asked these persons to describe their current or most recent project. Then they asked whether the person had consulted a librarian. They asked how a person begins, sustains and builds a bibliography in areas which interest him or her. They asked how people keep up, how would they advise a neophyte to write his/her first article for publication, and what place, if any, bibliographic tools had in their research. They asked them how they organized their research materials, and how they located materials for their projects.

Appendix 2c

Sources Most Relevant to the Information Services Study

Allen, Thomas J. Managing the Flow of Technology: Technology Transfer and the Dissemination of Technological Information within the R&D Organization. Cambridge, MA : MIT Press, 1977.

Almquist, Eric. An Examination of Work-Related Information Acquisition and Usage among Scientific, Technical and Medical Fields. Presented at the 1991 Faxon Institute Annual Conference, Creating User Pathways to Electronic Information, Reston, VA, April, 1991.

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Appendix 2e

Selected Sources with Alternative Methodologies

Arnett, Edward M. "Computer-based chemical information services." Science 170 : 3965, p. 1370-1376 (25 December 1970).

Three techniques were used with between 100-300 chemists who were users of an online system. 100 structured interviews were held, a questionnaire was distributed and investigators objectively observed chemists doing online searches.

Ellis, David. "Information Seeking Patterns and Retrieval System Design." ASSIGnation: Aslib Social Sciences Information Group Newsletter 7 (4) : 3-6, 1990.

In this study, several audiotaped interviews were held and then analyzed. The thrust of the study was very similar to this one.

Fishenden, R.M. "Methods by Which Research Workers Find Information. " Proceedings of the International Conference on Scientific Information. Washington, D.C.: National Academy of Sciences, 1959, p. 163-179.

Diary cards were used by 63 scientists at the British Atomic Energy Research Establishment to collect information on nearly 1900 "useful 'units of information'." Cards asked for the source and the means by which it was found. 50 scientists were then interviewed.

Hutchins, W.J., Pargeter, L.J. and W.L. Saunders. The Language Barrier: a Study in Depth of the Place of Foreign Language Materials in the Research Activity of an Academic Community. PGSLIS, Sheffield University, 1971.

In 1988, Norman Roberts and T.D. Wilson cited this study as worthy of attention because of the wide range of techniques used to obtain data. Besides interviews, various records were analyzed such as borrowing activity, inter-library loans, Xerox copying, in-house use and a citation analysis of the population's publications.

Kegan, Daniel L. "Measures of the Usefulness of Written Technical Information to Chemical Researchers." Journal of the American Society for Information Science 21 (3) : 179-186, 1970.

Ten researchers in a corporation recorded what items of written information they received in a four week period. Then, a waiting period followed. Next, they were asked whether the item(s) had proved useful. This data were then reviewed by the investigator and participant.

Mote, L.J.B. "Reasons for the Variations in the Information Needs of Scientists." Journal of Documentation 18 : 169-175, 1962.

Mote analyzed inquiries made to the library center.

Nilan, Michael S. and Fletcher Patricia T. "Information Behaviors in the Preparation of Research Proposals: a User study." in ASIS '87 : Proceedings of the 50th ASIS Annual Meeting. Boston, MA, October 4-8, 1987, Medford, N.J. : Learned Information Inc., p. 186-192.

This study examined "The proposal submission process as a potential model for an information system."

Olsen, Jan Kennedy. Appropriate Public Services for Agricultural Research Faculty, Final Report. Washington, DC : Association of Research Libraries, Office of Management Studies, January, 1985.

This ARL sponsored study secured 80 and 70 percent response rates to pre- and post-questionnaires from the faculty surveyed by Mann library. A period of free, expanded information services between the surveys provided data on used services. The report presents tables on how faculty keep current in their fields, their ratings of importance of library services and barriers to library use.

Rosenbloom, Richard S. and Wolek, Francis W. Technology and Information Transfer: a Survey of Practice in Industrial Organizations. Boston, MA : Harvard University Graduate School of Business Administration, Division of Research, 1970.

In this study, scientists were asked to recount three recent instances in which they had acquired technical information which they considered useful in the job and which was from a source outside their section. These were: 1) the most recent instance 2) the most useful instance in the last six months and 3) one most recent, other than the previous two, that was obtained from a written source.

Schuegraf, Ernst J. et al. "An Analysis of Personal Journal Subscriptions of University Faculty. Part I. Science." Journal of the American Society for Information Science 43 (1) : 28-33, 1992.

In the study, nearly all science faculty were interviewed, and data was obtained on a questionnaire for each journal subscription the individuals held. Journal name, length of subscription, classification (into one of five types), ranking and perceived presence of the titles in the library were some data collected.

Appendix 3

Areas for Question Development

A. Personal Background

- educational level/background/highest degree attained; discipline ("profession" or major); position/title; stage (rank) in academic career
- how would you describe your work style? Do you delegate often? Has work style changed in the last 5 years? (if so, how, why)
- experience outside academia (e.g. management or board experience)
- from list to be created, identify primary and secondary work activities and percent of time spent on each
- from list to be created, select primary professional affiliation/allegiance
- what or who has influenced you in developing your research style
- with what organizations/associations (editorial boards, consulting, etc.) are you involved
- how would you describe your role on your research team, lab or other work group?

Other possibilities:

- computer experience/use
- articles published in the last x years
- number of professional meetings attended last year
- research specialties

B. The Discipline

- how do you think the field has changed in the last 5 years? current trends?
- what is the nature and amount of collaboration in this field
- how fast is this field changing? what, if any, are some other disciplines with which someone in the field could become involved
- differences between discipline here and at other schools
- what is the importance of: seminars; preprints; reprints; personal contacts in this discipline
- what are the rules about scientific discovery in your discipline?

what/when do you publish? with whom do you share your work and at what point(s) in the research cycle?

- who are the leaders in the field?
- what expectations are placed on graduate students/post docs in your field? what is the expectation for the rate/timing of publication?
- what is your perspective of the discipline - its structure, subfields?
- describe computing activities in this field, how have they changed in the last 5 years?

C. Professional Development and Keeping Current

- how do you go about learning a new area in your field? a branch of the field? another field?
- how do you keep current (in the field? with the literature)? how much time do you spend doing this?
- how do you update your information? do you do this differently now than in the past?
- how often do you find yourself needing to come up to speed in a new area?
- how does the interdisciplinary nature of the field and your research affect how you find information and/or come up to speed in a new area?

D. Information Sources

- what types of published and unpublished materials do you use most often (provide list)
- is there a "hierarchy" of sources you consult? what is it?
- do you use computerized databases? what kind? how?
- do you use networks for gathering information? do you save e-mail? hard or soft format?
- rank sources in order of importance (break out; journal article, given by colleague; journal article, library; journal article, personal subscription)
- where do you get these sources? does the library have any role in providing them?
- have there been changes in the sources you use in the past 5 years? or in the ranking of their importance?

E. Timing

- at what points in your research do you need what types of information?
- how much time do you spend on gathering or seeking information?
- what are the predictable steps in your research?
- what is the research cycle over an academic year? does this vary year to year?

F. Methods of Acquiring Information

- what methods do you use to acquire information for your research and teaching?
- have any of your methods changed from what they were in the past?
- how often do you delegate information gathering? for what types of information? to whom?
- do methods of gathering information differ when teaching is the primary purpose rather than research?
- how do you verify information received?
- browsing - what do you browse? where? regularly?

- what use do you make of graduate students or other intermediaries?

G. Storing Information for Personal Use

- what types of information do you store? how much? how do you store and organize it?
- how do you make use of what you keep?

H. Scenario Building

- what are your problems with information now?
- how do you think they could be remedied?
- describe your "ideal world" as regards information
- how do you think the MIT Libraries could meet any of these needs?

I. Evaluating/Transmitting

- do you play a role as an advisor or mentor?
- how do you transmit information to your colleagues and to the field?

Appendix 4a

MIT Community Survey of Information Acquisition and Usage

MIT COMMUNITY SURVEY OF INFORMATION ACQUISITION AND USAGE

MIT Libraries

April 1992

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE, MASSACHUSETTS
02139

© Massachusetts Institute of Technology

SECTION ONE

Instructions: The purpose of this survey is to understand better the process by which MIT researchers such as yourself (*both faculty and students*) seek-out and acquire new information in the course of their work. Your participation in the survey is voluntary and anonymous. Your responses will be kept confidential and will be aggregated with the responses of other participants. Do not answer any question you consider inappropriate. The survey will take about thirty minutes to complete.

In order to gain an understanding of your information usage, we would appreciate your answering the following questions as they pertain to your *most recently* completed research paper or proposal wherein you are a principal author or investigator.

☞ ***Before you begin, please select from your files a copy of one such paper. If you do not have a paper or research proposal, please check here and skip to Section 5.*** ❑

1. When did you complete the paper? MONTH _____ YEAR 19 ____

☞ ***If your paper was not completed within the past 12 months, please check here and skip to Section 5.*** ❑

2. Are you the sole author? ❑ YES ❑ NO IF NO, what is the number of co-authors including yourself? ____

3. Has the paper been submitted for publication or presentation? ❑ YES ❑ NO

IF YES, please indicate where: _____

IF ACCEPTED, check here and indicate publication date ❑ MONTH _____ YEAR 19 _____

4. Please indicate which of the following *most closely* describes the nature and content of your paper:

❑ THEORETICAL RESEARCH	❑ EMPIRICAL RESEARCH	❑ LITERATURE REVIEW	❑ DISSERTATION
❑ EXPERIMENTAL RESEARCH	❑ TECHNICAL DEVELOPMENT	❑ COMMENTARY	❑ TERM PAPER
❑ APPLIED RESEARCH	❑ RESEARCH PROPOSAL	❑ OTHER _____	

5. Relative to other papers you have written, please rate this paper's merits in terms of the:

	NONE AT ALL			MODERATE			VERY MUCH
GAIN IN YOUR OWN UNDERSTANDING OF THE SUBJECT	1	2	3	4	5	6	7
INTEGRATION OF PREVIOUS LITERATURE ON THE SUBJECT	1	2	3	4	5	6	7
POTENTIAL VALUE TO OTHERS STUDYING THE SUBJECT	1	2	3	4	5	6	7
NOVELTY OF YOUR CONTRIBUTION	1	2	3	4	5	6	7
OVERALL QUALITY OF THE PAPER	1	2	3	4	5	6	7

6. Please locate the reference section of your paper. What is the total number of references? _____

☞ ***Carefully examine each reference in your paper and check only those which, to the best of your recollection, you became aware of for the first time in the course of the research described in your paper—that is, those references which you had not previously read or been aware of prior to undertaking your research.***

7. How many "first-time" references are there in total? _____

☞ ***If you have one or more "first-time" references, please proceed to answer the questions in the following sections. If you do not have any "first-time" references, please check here and skip to Section 5.*** ❑

SECTION TWO

We are interested in knowing more about the "first-time" references you just checked in your bibliography. Please select the first one of these references. The following series of questions will pertain to this reference, in particular.

Begin by citing the referenced work in full as it appears in your bibliography. Be sure to include the author name(s), title, source (*e.g., journal name*), and year of publication.

AUTHOR(S) _____

TITLE _____

SOURCE _____ PUBLICATION DATE 19 ____

1. What kind of document is the referenced work? [*please check one*]

- ☐ PAPER IN ACADEMIC JOURNAL
- ☐ BOOK OR MONOGRAPH
- ☐ TRADE JOURNAL OR MAGAZINE
- ☐ CONFERENCE PRESENTATION
- ☐ CHAPTER IN EDITED BOOK
- ☐ GOVERNMENT REPORT
- ☐ DISSERTATION
- ☐ TECHNICAL REPORT
- ☐ AUDIO-VISUAL MEDIA
- ☐ PATENT DISCLOSURE
- ☐ WORKING OR DISCUSSION PAPER
- ☐ UNPUBLISHED MANUSCRIPT
- ☐ OTHER _____

2. We would like to know how you initially became aware of the existence of the referenced work and, in particular, whether: (1) you learned of its existence by chance, in the normal course of your reading literature in the field; or (2) while you were specifically searching for literature on the subject; or (3) someone else brought it to your attention. [*please read carefully through the entire list and then check the most appropriate*]

- ☐ YOU BECAME AWARE OF THE REFERENCED WORK BY CHANCE, IN THE NORMAL COURSE OF READING
  - ☐ MATERIALS YOU (OR YOUR DEPARTMENT) SUBSCRIBE TO
  - ☐ MATERIALS IN THE LIBRARY
  - ☐ OTHER _____
- ☐ YOU BECAME AWARE OF THE REFERENCED WORK WHILE SEARCHING SPECIFICALLY FOR LITERATURE ON THE SUBJECT . . .
  - ☐ USING PRINTED INDEX OR ABSTRACT . . . ☐ YOURSELF, OR ☐ WITH LIBRARIAN ASSISTANCE
  - ☐ USING ON-LINE BIBLIOGRAPHIC DATABASES . . . ☐ YOURSELF, OR ☐ WITH LIBRARIAN ASSISTANCE
  - ☐ USING CD-ROM BIBLIOGRAPHIC DATABASES . . . ☐ YOURSELF, OR ☐ WITH LIBRARIAN ASSISTANCE
  - ☐ USING CURRENT CONTENTS OR SIMILAR SERVICE . . . ☐ YOURSELF, OR ☐ WITH LIBRARIAN ASSISTANCE
  - ☐ OTHER _____
- ☐ THE REFERENCED WORK WAS BROUGHT TO YOUR ATTENTION BY . . .
  - ☐ YOUR CO-AUTHOR(S)
  - ☐ THE AUTHOR(S) OF THE REFERENCED WORK
  - ☐ A COLLEAGUE (OR FELLOW STUDENT)
  - ☐ YOUR RESEARCH ASSISTANT
  - ☐ YOUR SUPERVISOR
  - ☐ YOUR INSTRUCTOR
  - ☐ A PEER REVIEWER
  - ☐ OTHER _____
- ☐ YOU BECAME AWARE OF THE REFERENCED WORK WHILE ATTENDING A CONFERENCE, WORKSHOP, OR SEMINAR
- ☐ YOU BECAME AWARE OF THE REFERENCED WORK BECAUSE IT WAS CITED IN SOMEONE ELSE'S WORK YOU WERE READING
- ☐ YOU'RE NOT SURE HOW YOU FIRST BECAME AWARE OF THE REFERENCED WORK
- ☐ OTHER _____

3. Were you able to obtain the referenced work? ❑ YES ❑ NO ❑ DIDN'T TRY TO OBTAIN IT

IF YES, how did you obtain the referenced work? [*please check*]

- ❑ FROM PERSONAL (OR DEPT.) SUBSCRIPTION
- ❑ FROM THE AUTHOR(S) OF THE REFERENCED WORK
- ❑ FROM YOUR CO-AUTHOR(S)
- ❑ FROM THE MIT LIBRARIES
- ❑ FROM A NON-MIT LIBRARY
- ❑ A RESEARCH ASSISTANT OBTAINED IT FOR YOU
- ❑ FROM A COLLEAGUE (OR FELLOW STUDENT)
- ❑ FROM YOUR SUPERVISOR
- ❑ FROM YOUR INSTRUCTOR
- ❑ PURCHASED FROM THE PUBLISHER OR A BOOKSTORE
- ❑ NOT SURE HOW YOU OBTAINED IT
- ❑ OTHER _____

IF NO, are any of the following reasons attributable to your lack of success in obtaining it? [*please check*]

- ❑ TOO RECENTLY PUBLISHED TO BE FOUND IN THE MIT LIBRARIES
- ❑ NOT OWNED BY THE MIT LIBRARIES
- ❑ ALREADY LOANED-OUT TO ANOTHER LIBRARY PATRON
- ❑ NOT LOANED-OUT, BUT UNABLE TO LOCATE ON THE SHELVES OF THE MIT LIBRARIES
- ❑ OTHER _____

4. Are you personally acquainted with one or more authors of the referenced work? ❑ YES ❑ NO

IF YES, please indicate your relationship to the author(s): [*please check one*]

- ❑ YOUR (PRESENT OR FORMER) STUDENT IS AN AUTHOR
- ❑ YOUR (PRESENT OR FORMER) SUPERVISOR IS AN AUTHOR
- ❑ YOUR (PRESENT OR FORMER) INSTRUCTOR IS AN AUTHOR
- ❑ A COLLEAGUE AT MIT IS AN AUTHOR
- ❑ A COLLEAGUE OUTSIDE MIT IS AN AUTHOR
- ❑ A FRIEND OR ACQUAINTANCE IS AN AUTHOR
- ❑ OTHER _____

5. How important is your knowledge of the referenced work to the quality of your own paper? [*please circle*]

NOT AT ALL IMPORTANT			SOMEWHAT IMPORTANT			VERY IMPORTANT
1	2	3	4	5	6	7

6. If you had not been aware of the referenced work, how much would the value of your paper's contribution be diminished?

NOT AT ALL DIMINISHED			SOMEWHAT DIMINISHED			GREATLY DIMINISHED
1	2	3	4	5	6	7

7. When did you first become aware of the referenced work? [*please check one*]

- ❑ DURING THE EARLY STAGES, WHILE PLANNING THE RESEARCH REPORTED IN YOUR PAPER
- ❑ DURING THE MIDDLE STAGES, WHILE UNDERTAKING THE RESEARCH REPORTED IN YOUR PAPER
- ❑ DURING THE LATER STAGES, WHILE WRITING YOUR PAPER

SECTION THREE

If there are more than one "first-time" references in your bibliography, please select the last such reference. The following series of questions will pertain to this "first time" reference, in particular.

Begin by citing the referenced work in full as it appears in your bibliography. Be sure to include the author name(s), title, source (*e.g., journal name*), and year of publication.

AUTHOR(S) _____

TITLE _____

SOURCE _____ PUBLICATION DATE 19 ____

1. What kind of document is the referenced work? [*please check one*]

- ☐ PAPER IN ACADEMIC JOURNAL
- ☐ BOOK OR MONOGRAPH
- ☐ TRADE JOURNAL OR MAGAZINE
- ☐ CONFERENCE PRESENTATION
- ☐ CHAPTER IN EDITED BOOK
- ☐ GOVERNMENT REPORT
- ☐ DISSERTATION
- ☐ TECHNICAL REPORT
- ☐ AUDIO-VISUAL MEDIA
- ☐ PATENT DISCLOSURE
- ☐ WORKING OR DISCUSSION PAPER
- ☐ UNPUBLISHED MANUSCRIPT
- ☐ OTHER _____

2. We would like to know how you initially became aware of the existence of the referenced work and, in particular, whether: (1) you learned of its existence by chance, in the normal course of your reading literature in the field; or (2) while you were specifically searching for literature on the subject; or (3) someone else brought it to your attention. [*please read carefully through the entire list and then check the most appropriate*]

- ☐ YOU BECAME AWARE OF THE REFERENCED WORK BY CHANCE, IN THE NORMAL COURSE OF READING
  - ☐ MATERIALS YOU (OR YOUR DEPARTMENT) SUBSCRIBE TO
  - ☐ MATERIALS IN THE LIBRARY
  - ☐ OTHER _____
- ☐ YOU BECAME AWARE OF THE REFERENCED WORK WHILE SEARCHING SPECIFICALLY FOR LITERATURE ON THE SUBJECT . . .
  - ☐ USING PRINTED INDEX OR ABSTRACT . . . ☐ YOURSELF, OR ☐ WITH LIBRARIAN ASSISTANCE
  - ☐ USING ON-LINE BIBLIOGRAPHIC DATABASES . . . ☐ YOURSELF, OR ☐ WITH LIBRARIAN ASSISTANCE
  - ☐ USING CD-ROM BIBLIOGRAPHIC DATABASES . . . ☐ YOURSELF, OR ☐ WITH LIBRARIAN ASSISTANCE
  - ☐ USING CURRENT CONTENTS OR SIMILAR SERVICE . . . ☐ YOURSELF, OR ☐ WITH LIBRARIAN ASSISTANCE
  - ☐ OTHER _____
- ☐ THE REFERENCED WORK WAS BROUGHT TO YOUR ATTENTION BY . . .
  - ☐ YOUR CO-AUTHOR(S)
  - ☐ THE AUTHOR(S) OF THE REFERENCED WORK
  - ☐ A COLLEAGUE (OR FELLOW STUDENT)
  - ☐ YOUR RESEARCH ASSISTANT
  - ☐ YOUR SUPERVISOR
  - ☐ YOUR INSTRUCTOR
  - ☐ A PEER REVIEWER
  - ☐ OTHER _____
- ☐ YOU BECAME AWARE OF THE REFERENCED WORK WHILE ATTENDING A CONFERENCE, WORKSHOP, OR SEMINAR
- ☐ YOU BECAME AWARE OF THE REFERENCED WORK BECAUSE IT WAS CITED IN SOMEONE ELSE'S WORK YOU WERE READING
- ☐ YOU'RE NOT SURE HOW YOU FIRST BECAME AWARE OF THE REFERENCED WORK
- ☐ OTHER _____

3. Were you able to obtain the referenced work? ❑ YES ❑ NO ❑ DIDN'T TRY TO OBTAIN IT

IF YES, how did you obtain the referenced work? [*please check*]

- ❑ FROM PERSONAL (OR DEPT.) SUBSCRIPTION
- ❑ FROM THE AUTHOR(S) OF THE REFERENCED WORK
- ❑ FROM YOUR CO-AUTHOR(S)
- ❑ FROM THE MIT LIBRARIES
- ❑ FROM A NON-MIT LIBRARY
- ❑ A RESEARCH ASSISTANT OBTAINED IT FOR YOU
- ❑ FROM A COLLEAGUE (OR FELLOW STUDENT)
- ❑ FROM YOUR SUPERVISOR
- ❑ FROM YOUR INSTRUCTOR
- ❑ PURCHASED FROM THE PUBLISHER OR A BOOKSTORE
- ❑ NOT SURE HOW YOU OBTAINED IT
- ❑ OTHER _____

IF NO, are any of the following reasons attributable to your lack of success in obtaining it? [*please check*]

- ❑ TOO RECENTLY PUBLISHED TO BE FOUND IN THE MIT LIBRARIES
- ❑ NOT OWNED BY THE MIT LIBRARIES
- ❑ ALREADY LOANED-OUT TO ANOTHER LIBRARY PATRON
- ❑ NOT LOANED-OUT, BUT UNABLE TO LOCATE ON THE SHELVES OF THE MIT LIBRARIES
- ❑ OTHER _____

4. Are you personally acquainted with one or more authors of the referenced work? ❑ YES ❑ NO

IF YES, please indicate your relationship to the author(s): [*please check one*]

- ❑ YOUR (PRESENT OR FORMER) STUDENT IS AN AUTHOR
- ❑ YOUR (PRESENT OR FORMER) SUPERVISOR IS AN AUTHOR
- ❑ YOUR (PRESENT OR FORMER) INSTRUCTOR IS AN AUTHOR
- ❑ A COLLEAGUE AT MIT IS AN AUTHOR
- ❑ A COLLEAGUE OUTSIDE MIT IS AN AUTHOR
- ❑ A FRIEND OR ACQUAINTANCE IS AN AUTHOR
- ❑ OTHER _____

5. How important is your knowledge of the referenced work to the quality of your own paper? [*please circle*]

NOT AT ALL IMPORTANT			SOMEWHAT IMPORTANT			VERY IMPORTANT
1	2	3	4	5	6	7

6. If you had not been aware of the referenced work, how much would the value of your paper's contribution be diminished?

NOT AT ALL DIMINISHED			SOMEWHAT DIMINISHED			GREATLY DIMINISHED
1	2	3	4	5	6	7

7. When did you first become aware of the referenced work? [*please check one*]

- ❑ DURING THE EARLY STAGES, WHILE PLANNING THE RESEARCH REPORTED IN YOUR PAPER
- ❑ DURING THE MIDDLE STAGES, WHILE UNDERTAKING THE RESEARCH REPORTED IN YOUR PAPER
- ❑ DURING THE LATER STAGES, WHILE WRITING YOUR PAPER

SECTION FOUR

If there are more than two "first-time" references in your bibliography, please select the one nearest the middle. The following series of questions will pertain to this "first time" reference, in particular.

Begin by citing the referenced work in full as it appears in your bibliography. Be sure to include the author name(s), title, source (*e.g., journal name*), and year of publication.

AUTHOR(S) _____

TITLE _____

SOURCE _____ PUBLICATION DATE 19__

1. What kind of document is the referenced work? [*please check one*]

- ❑ PAPER IN ACADEMIC JOURNAL
- ❑ BOOK OR MONOGRAPH
- ❑ TRADE JOURNAL OR MAGAZINE
- ❑ CONFERENCE PRESENTATION
- ❑ CHAPTER IN EDITED BOOK
- ❑ GOVERNMENT REPORT
- ❑ DISSERTATION
- ❑ TECHNICAL REPORT
- ❑ AUDIO-VISUAL MEDIA
- ❑ PATENT DISCLOSURE
- ❑ WORKING OR DISCUSSION PAPER
- ❑ UNPUBLISHED MANUSCRIPT
- ❑ OTHER _____

2. We would like to know how you initially became aware of the existence of the referenced work and, in particular, whether: (1) you learned of its existence by chance, in the normal course of your reading literature in the field; or (2) while you were specifically searching for literature on the subject; or (3) someone else brought it to your attention. [*please read carefully through the entire list and then check the most appropriate*]

❑ YOU BECAME AWARE OF THE REFERENCED WORK BY CHANCE, IN THE NORMAL COURSE OF READING

- ❑ MATERIALS YOU (OR YOUR DEPARTMENT) SUBSCRIBE TO
- ❑ MATERIALS IN THE LIBRARY
- ❑ OTHER _____

❑ YOU BECAME AWARE OF THE REFERENCED WORK WHILE SEARCHING SPECIFICALLY FOR LITERATURE ON THE SUBJECT . . .

❑ USING PRINTED INDEX OR ABSTRACT . . .	❑ YOURSELF, OR	❑ WITH LIBRARIAN ASSISTANCE
❑ USING ON-LINE BIBLIOGRAPHIC DATABASES . . .	❑ YOURSELF, OR	❑ WITH LIBRARIAN ASSISTANCE
❑ USING CD-ROM BIBLIOGRAPHIC DATABASES . . .	❑ YOURSELF, OR	❑ WITH LIBRARIAN ASSISTANCE
❑ USING CURRENT CONTENTS OR SIMILAR SERVICE . . .	❑ YOURSELF, OR	❑ WITH LIBRARIAN ASSISTANCE

- ❑ OTHER _____

❑ THE REFERENCED WORK WAS BROUGHT TO YOUR ATTENTION BY . . .

❑ YOUR CO-AUTHOR(S)	❑ YOUR SUPERVISOR
❑ THE AUTHOR(S) OF THE REFERENCED WORK	❑ YOUR INSTRUCTOR
❑ A COLLEAGUE (OR FELLOW STUDENT)	❑ A PEER REVIEWER
❑ YOUR RESEARCH ASSISTANT	❑ OTHER _____

- ❑ YOU BECAME AWARE OF THE REFERENCED WORK WHILE ATTENDING A CONFERENCE, WORKSHOP, OR SEMINAR
- ❑ YOU BECAME AWARE OF THE REFERENCED WORK BECAUSE IT WAS CITED IN SOMEONE ELSE'S WORK YOU WERE READING
- ❑ YOU'RE NOT SURE HOW YOU FIRST BECAME AWARE OF THE REFERENCED WORK
- ❑ OTHER _____

3. Were you able to obtain the referenced work? ❑ YES ❑ NO ❑ DIDN'T TRY TO OBTAIN IT

IF YES, how did you obtain the referenced work? [*please check*]

- ❑ FROM PERSONAL (OR DEPT.) SUBSCRIPTION
- ❑ FROM THE AUTHOR(S) OF THE REFERENCED WORK
- ❑ FROM YOUR CO-AUTHOR(S)
- ❑ FROM THE MIT LIBRARIES
- ❑ FROM A NON-MIT LIBRARY
- ❑ A RESEARCH ASSISTANT OBTAINED IT FOR YOU
- ❑ FROM A COLLEAGUE (OR FELLOW STUDENT)
- ❑ FROM YOUR SUPERVISOR
- ❑ FROM YOUR INSTRUCTOR
- ❑ PURCHASED FROM THE PUBLISHER OR A BOOKSTORE
- ❑ NOT SURE HOW YOU OBTAINED IT
- ❑ OTHER _____

IF NO, are any of the following reasons attributable to your lack of success in obtaining it? [*please check*]

- ❑ TOO RECENTLY PUBLISHED TO BE FOUND IN THE MIT LIBRARIES
- ❑ NOT OWNED BY THE MIT LIBRARIES
- ❑ ALREADY LOANED-OUT TO ANOTHER LIBRARY PATRON
- ❑ NOT LOANED-OUT, BUT UNABLE TO LOCATE ON THE SHELVES OF THE MIT LIBRARIES
- ❑ OTHER _____

4. Are you personally acquainted with one or more authors of the referenced work? ❑ YES ❑ NO

IF YES, please indicate your relationship to the author(s): [*please check one*]

- ❑ YOUR (PRESENT OR FORMER) STUDENT IS AN AUTHOR
- ❑ YOUR (PRESENT OR FORMER) SUPERVISOR IS AN AUTHOR
- ❑ YOUR (PRESENT OR FORMER) INSTRUCTOR IS AN AUTHOR
- ❑ A COLLEAGUE AT MIT IS AN AUTHOR
- ❑ A COLLEAGUE OUTSIDE MIT IS AN AUTHOR
- ❑ A FRIEND OR ACQUAINTANCE IS AN AUTHOR
- ❑ OTHER _____

5. How important is your knowledge of the referenced work to the quality of your own paper? [*please circle*]

NOT AT ALL IMPORTANT			SOMEWHAT IMPORTANT			VERY IMPORTANT
1	2	3	4	5	6	7

6. If you had not been aware of the referenced work, how much would the value of your paper's contribution be diminished?

NOT AT ALL DIMINISHED			SOMEWHAT DIMINISHED			GREATLY DIMINISHED
1	2	3	4	5	6	7

7. When did you first become aware of the referenced work? [*please check one*]

- ❑ DURING THE EARLY STAGES, WHILE PLANNING THE RESEARCH REPORTED IN YOUR PAPER
- ❑ DURING THE MIDDLE STAGES, WHILE UNDERTAKING THE RESEARCH REPORTED IN YOUR PAPER
- ❑ DURING THE LATER STAGES, WHILE WRITING YOUR PAPER

SECTION FIVE

1. What is your highest academic degree completed or in progress?

- ❑ BACHELOR'S DEGREE
- ❑ MASTER'S DEGREE
- ❑ DOCTORAL DEGREE
- ❑ OTHER _____

2. What was the date of degree completion (or expected completion)? YEAR 19 ____

3. What is your degree field of study? _____

4. What is your present status at MIT?

- ❑ UNDERGRADUATE STUDENT
- ❑ GRADUATE STUDENT
- ❑ INSTRUCTOR OR LECTURER
- ❑ POST-DOCTORAL ASSOCIATE OR FELLOW
- ❑ VISITING SCHOLAR
- ❑ RESEARCH SCIENTIST OR ENGINEER
- ❑ ADJUNCT PROFESSOR
- ❑ ASSISTANT PROFESSOR
- ❑ ASSOCIATE PROFESSOR
- ❑ FULL PROFESSOR
- ❑ PROFESSOR EMERITUS
- ❑ OTHER _____

5. Which MIT department or school are you affiliated with?

- ❑ BRAIN & COGNITIVE SCIENCES
- ❑ MATERIALS SCIENCE & ENGINEERING
- ❑ SLOAN SCHOOL OF MANAGEMENT
  - ❑ BEHAVIORAL & POLICY SCIENCES
  - ❑ ECONOMICS, FINANCE & ACCOUNTING
  - ❑ MANAGEMENT SCIENCE

6. Do you hold an administrative post at MIT, such as a department head, laboratory director, or dean?

❑ YES ❑ NO

7. Generally speaking, how satisfied are you in your ability to acquire the information you need to perform your research?

NOT AT ALL SATISFIED			SOMEWHAT SATISFIED			VERY SATISFIED
1	2	3	4	5	6	7

If you are able to include a copy of the bibliography you used in answering this survey, we would greatly appreciate your help in doing so.

Thank you very much for your help! To return the questionnaire, simply staple it and place it in interdepartmental mail.

Appendix 4b

Interview Guide

INTERVIEW GUIDE : INFORMATION SERVICES STUDY

The purpose of the Information Services Study being conducted by the MIT Libraries is to learn more about how researchers at MIT seek and gather information for their teaching, research and learning. Each member of the three disciplines being studied, Brain and Cognitive Sciences, Management, and Materials Science and Engineering, received a questionnaire during the last week of April which focused on information gathering done for a recently completed paper or proposal. In order to supplement the data received from respondents to this questionnaire, the members of the Libraries staff working on this project intend to complete a series of interviews with faculty and research staff in these three areas and hold discussion groups with students. The following is a guide for the interviews.

QUESTIONS

1. Please describe your present mix of teaching and research. What courses are you teaching? In what areas are you now conducting research projects? Are you supervising any research, e.g. UROPs, theses? At what stages are your projects-are some just beginning, others near completion?

2. I'd like to ask you some questions about information you might have gathered recently for one of your projects or for your teaching. Please think of the last time you had a problem or question which you couldn't answer from your own immediate knowledge.

a. What were you working on when you realized you wanted or needed information related to the project at hand?

b. What specific information did you need or want?

c. How did you attempt to locate this information?

-did you search for it yourself?

-where did you look for the information?

--did you ask someone (how-in person? phone? E-mail?)

--did you look in written sources? in your own files or books?

d. What information did you obtain? Was it the information you were looking for?

e. Where did you find it?

f. To what use did you put what you found?

g. Was this fairly typical of the kinds of searches you do? If not, what are more typical searches for you?

3. You've just described a recent search for information in the course of your research (teaching). Sometimes useful information is found by chance. Has this happened to you on one of your projects recently? When? What was the information you came across or obtained? How did it reach you?

4. I'd now like to ask you a question about journals. For the last journal article you read:
-When did you read it?
-Where was it from (eg your own subscription)?
-How did you come across it?
-What use, if any, did you make of it?

5. I'd now like to ask you a few more questions about the kind of materials you use in your research. Here is a list of various types of information sources. Could you indicate which ones you have used in the last 6 months, and, if possible, tell me where you went to find or consult them? (give list)

6. Are any of these sources ones that you rely on more now than in the past?
7. Could you describe your use, if any, of computerized databases? E-mail? networks?

8. Have you had to make a search of the literature recently? How did you do it?

9. Do the Libraries now play a role in your gathering of information? What is it?

10. Keeping current in the field

A common complaint by some researchers is that it is increasingly difficult to keep up with the literature in a given field.

a. How are new findings transmitted in your field?
b. What do you do to keep up with new developments in your areas of interest?
c. Do you do different things depending on the topic of interest?
d. If you recently began following a line of research you hadn't been following previously, what did you do?
e. When you need to update information on your own areas, what do you do?

11. I'd now like to ask a question which was posed to over 250 faculty in all areas of science, social sciences and humanities by a group called the Research Libraries Group. They asked scholars this:

a. How has your discipline changed in the last 15-20 years? They then asked them if any of the changes implied a need to exploit data in new ways or make new information available. How would <u>you</u> answer this, and do you think anything going on in your discipline should be changing the way we get and store information?

b. Are there changes going on in your particular areas of research and teaching? What are the "new frontiers" or current trends in these areas?

c. Are there any developments overseas which are having an impact in your field? Is access to this information important? sufficient?

d. What role(s) do computers play in your field? Have they changed the way you do research or look for information?

12. Can you describe what an ideal library/information system in your field would be like?

13. Are there ways in which people in the library and information systems areas at MIT could become more closely involved with the researchers here?

14. Is there a new, expanded or improved information service which could be supplied to you? What would that be?

Sources of Information

Preprints

Journals

Conferences or their proceedings

Printed indexes

Online Bibliographic Databases

CD-ROM databases

Technical Reports

Standards or specifications

Legal materials

Computer data files (e.g. Genbank, U.S. Census tapes)

Handbooks, dictionaries, other reference works

Patents

Electronic Discussion Lists (eg., those on the Internet)

Appendix 4c

Focus Group Discussion Guide

Information Services Study
Focus Group Discussion Guide

Introduction — 5 minutes

— *Welcome participants. Thank them for coming.*

— *Tell them you hope they enjoyed the meal. Have them help themselves to coffee and dessert now (so they don't disturb the discussion later).*

— *Ask if they found their name card (first name only); placed for you to see.*

— *Introduce yourself. Name, position in department.*

My role here today is to guide the discussion and to make sure that everyone in the room has the opportunity to share his or her views on the topic at hand.

— *If Library representatives are present, introduce them.*

— *Statement of objective:*

We're here tonight to talk about ways that you gather information in your course work and research projects. This discussion is not about the *topics* you research; instead, we'll be looking at your research needs and how you go about keeping current in your field. This meeting is what's known as a "focus group" in the market research industry. It's being sponsored by the MIT Libraries, but I'd like to state up front that we will *not* be limiting our discussion to sources of information in the library.

— *Tell participants that the discussion will take approximately one-and-a-half hours.*

— *Mention the confidentiality of the focus group discussion.*

The discussion is being videotaped so that I don't have to take notes now but can review the session afterwards. No one will be identified by name. We are conducting a number of these focus groups along with a companion survey, which will form the basis of a report on information needs of MIT students and instructors.

— *Ground rules:*

- Only one person should talk at a time so that we can focus on what he or she is saying.
- Don't have conversations on the side that distract the overall discussion.
- Speak up so we all can hear you.
- Feel free to offer suggestions or criticism. We're here to learn both about your information needs and how to better serve those needs.

Participant Introductions 5 minutes

— This focus group brings together (students/instructors) from the (Brain & Cognitive Sciences Department/ Materials Science and Engineering Department/ Sloan School).

Ask participants to introduce themselves.

- Your name—first name is sufficient.
- What year student are you here at MIT? /What is your position here at MIT?
- Your area of specialization.

Research Concept 10 minutes

— Let's begin by going around the room and having people briefly discuss what different types of research you conduct—either related to course work or individual projects—and how often you conduct such research. (Write an article, paper, book, speech, presentation, proposal, consulting, R&D on a new product.)

— Where do you get your ideas for a research project or paper? Think about your current or most recent paper, or projects in general.
Is it assigned or is it your own choice?
Is it a matter of inspiration?
Does an idea come to you out of a discussion with colleagues or in class?
By reading? Reading what in particular?
Hearing about something current in the news media?

Information Gathering 20 minutes

— Beginning

In beginning your research on a topic, where do you generally turn first to conduct exploratory research?
Who are the first people you talk to and what are the first things you read? In other words, how does the research process begin?

— Process

Once you've begun your research, what steps do you take in the process of gathering information? Do you have a systematic approach toward finding the information you need, or frankly is it a more haphazard approach? Which is more productive?
What sources of information and modes of communication—formal or informal, in-person, written or electronic—do you use, and in what order to do use them?
How do you organize and store the information you develop and gather in your research?
What role do computers play in your field, and how does new technology change the way you conduct research?
Do you feel you know how to make good use of computers in gathering information you need to conduct research?
What developments overseas are having a major impact on your field?

— Dissemination

How do you present what you learn? In what ways is the information that you have gathered in a research project passed on to your colleagues? Do you typically discuss and present the information? If so, where?

Information Sources 30 minutes

— Handout

Let's focus on some of the specific sources of information that we've been discussing. I'm going to pass out a list of various possible sources of information. *Hand out.*
On this sheet, please rate each information source in terms of its usefulness in a typical—or your most recent—research project. *Do not collect handouts yet. After 5 minutes, proceed.*

— Person-to-person

Let's talk for a while about person-to-person communications as an information source for your research projects and papers.
Which are the most productive ways to gather information at a personal level?
Which do you find yourself relying more and more on? And which are becoming less frequent sources of information?

- Discussions with students/instructors at MIT
- Discussions/letters with colleagues at other universities
- Discussions/letters with people in business & industry
- Librarians, technical information specialists
- Conferences, seminars you have attended
- Electronic Mail

— Written/visual

Next, let's focus on the written and visual materials on the list.
Which ones are the most useful? Why? (Strengths and weaknesses? Pertinent to your needs? Quality information? Up to date? Easy to find? Easy to use?)
Which written sources of information do you use most frequently, which do you use infrequently? And why?
Which would you like to learn more about or make greater use of if you could?

- Books—your personal library, textbooks, handbooks, standards, manuals, book stores
- Journals and periodicals
- Preprints, abstracts, technical reports, conference papers
- Printed indexes
- On-line and CD-ROM data bases
- Computerized literature searches
- Audio, videotapes from conferences, TV documentaries

— Other

Are there any other forms of communication or information gathering that we haven't discussed that should be included on this list?

Library Services 20 minutes

— What types of library services are the easiest to find and use? The hardest to find and use?

— How do you envision an ideal library/information system of the future—one that would meet the new demands of your field?
What changes do you see in your own field of study that prompt the need for changes in the way information is collected and disseminated?

— What role do the MIT Libraries play in your research or course work? Which libraries do you use most often? For what purpose? To...

- Consult the reference collection?
- Borrow books?
- Use books on reserve for course work?
- Journals or periodicals?
- Conduct database searches? Use Barton?
- Use Athena? Word processing? Copying services?
- To consult with a librarian?

— Do you normally use other libraries outside MIT? Why, and what for?

— If there were one new, expanded or improved information service that the MIT Libraries could supply you, what would it be?

Close

— *On behalf of MIT Libraries, thank participants for coming; they've been very helpful; hope they enjoyed the discussion. Collect handouts.*

Sources of Information

Typical or Most Recent Research Project

	Usefulness, on 1-10 scale (10 = high)
Person-to-person:	
1. Discussions with students/instructors at MIT	____
2. Discussions/letters with colleagues at other universities	____
3. Discussions/letters with people in business & industry	____
4. Librarians, technical information specialists	____
5. Conferences, seminars you have attended	____
6. Electronic Mail	____
Written/Visual:	
7. Personal library	____
8. Textbooks	____
9. Book stores	____
10. Handbooks, standards, manuals	____
11. Journals and periodicals	____
12. News media	____
13. Preprints, abstracts, technical reports, conference papers	____
14. Printed indexes	____
15. On-line and CD-ROM data bases	____
16. Computerized literature searches	____
17. Audio, videotapes from conferences, TV documentaries	____
Other:	
18. (Specify:) _____	____

Appendix 5

Statistical Summary of the Questionnaire

Library Survey Summary Statistics
Comparison between Groups

	B&CS	MSE	Sloan	Total
Number of respondents:	42	86	109	241
Number of respondents having completed a research paper:	30	55	92	177
Percent of respondents having completed a research paper:	71%	64%	84%	73%
Average number of months transpired since paper was completed:	5	5	3	4
Average number of co-authors (including respondent):	2.4	2.2	1.4	1.8
Percent of papers submitted for publication or presentation:	85%	53%	25%	43%
Percent of submitted papers already accepted for publication:	20%	63%	32%	38%

Category best describing nature and content of respondent's paper:	B&CS	MSE	Sloan	Total
experimental research	65%	36%	5%	24%
term paper	4	16	29	21
empirical research	4	2	24	14
literature review	0	22	9	11
theoretical research	12	6	7	7
applied research	7	2	9	7
dissertation	0	2	9	5
research proposal	0	10	3	5
other	0	2	3	2
commentary	4	2	1	2
technical development	4	0	1	1
	100%	100%	100%	100%

Respondent's own evaluation of their paper's merits relative to other papers she/he has written (scale 1=none at all; 7=very much):	B&CS	MSE	Sloan	Total
gain in your own understanding of the subject	5.7	5.7	5.6	5.6
integration of previous literature on the subject	5.1	4.9	4.6	4.8
potential value to others studying the subject	5.8	4.9	4.8	5.0
novelty of your contribution	5.7	4.3	4.4	4.6
overall quality of the paper	5.8	5.2	5.0	5.2

	B&CS	MSE	Sloan	Total
Average number of references contained in paper:	42	26	32	32
Average number of "first time" references:	16	14	19	16
First-time references as a percentage of the total:	38%	54%	59%	50%
Percentage of respondent's with at least one first-time reference:	90%	88%	93%	91%
Total number of references reported:	1213	1309	2994	5287
Total number of first-time references reported:	467	726	1633	2692
Number of first-time references randomly selected for survey:	78	124	235	437
Randomly selected first-time references as percent of total:	17%	17%	14%	16%
Average age (in years) of first-time reference:	10	10	5	7

Distribution of referenced works by kind of document:	B&CS	MSE	Sloan	Total
paper in academic journal	63%	60%	34%	47%
book or monograph	13	13	20	16
trade journal or magazine	1	4	18	11
conference presentation	6	14	3	7
chapter in edited book	8	5	6	6
dissertation	3	1	4	3
technical report	5	2	3	3
working or discussion paper	0	2	4	2
government report	0	1	3	2
other	1	0	3	2
unpublished manuscript	0	0	2	1
patent disclosure	0	0	0	0
audio-visual media	0	0	0	0
	100%	100%	100%	100%

	B&CS	MSE	Sloan	Total
references brought to respondent's attention by someone else:	40%	29%	35%	34%
references found searching specifically for literature on the subject:	23	28	38	32
references found while reading other work:	18	26	15	19
references found by chance, in the normal course of reading	12	11	9	10
references found while attending a conference:	5	3	3	3
not sure how reference was found or other:	1	2	0	1
	100%	100%	100%	100%

Percentage of references found by chance which were...	B&CS	MSE	Sloan	Total
materials resepondent (or respondent's department) subscribe to	67%	23%	30%	36%
materials in the MIT Library	11	77	55	52
other	22	0	15	12
	100%	100%	100%	100%

Percentage of references found while searching specifically for literature on the subject which were...	B&CS	MSE	Sloan	Total
found using on-line bibliographic databases	44%	29%	52%	45&
found using cd-rom bibliographic databases	11	24	24	23
found using printed index or abstract	6	35	15	19
found using current contents	11	0	0	1
other	28	12	8	11
	100%	100%	100%	100%

Percentage of references found while searching specifically for literature on the subject which were...	B&CS	MSE	Sloan	Total
found without librarian assistance:	78%	79%	85%	82%
found with librarian assistance:	22%	21%	15%	18%

Percentage of references brought to respondent's attention by someone else which came from...	B&CS	MSE	Sloan	Total
a colleague (or fellow student)	35%	31%	26%	29%
respondent's supervisor	13	28	20	20
the author(s) of the referenced work	19	19	13	16
respondent's instructor	3	8	17	12
respondent's co-author(s)	26	6	7	11
other	0	0	16	9
respondent's research assistant	0	8	1	3
a peer reviewer	3	0	0	0
	100%	100%	100%	100%

	B&CS	MSE	Sloan	Total
Percentage of referenced works that were obtained for use by respondent	95%	98%	94%	95%

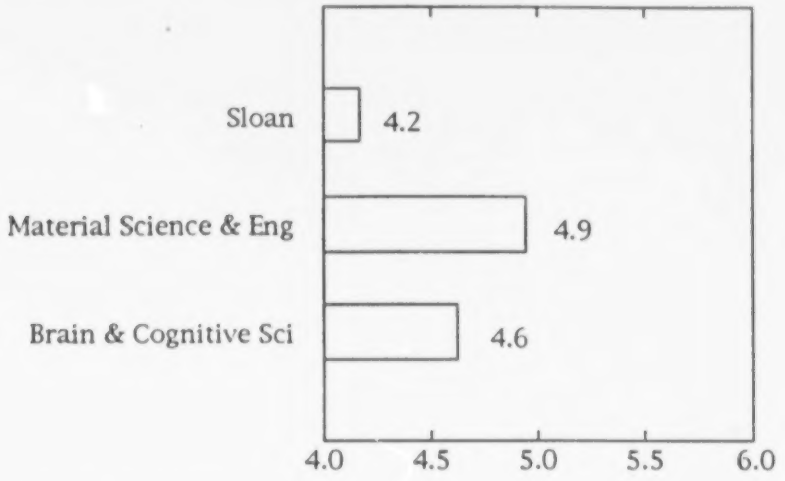
Distribution of references according to how they were actually obtained by respondent:	B&CS	MSE	Sloan	Total
from the mit libraries	37	62	52	52%
from the author(s) of the referenced work	10	8	7	8
from a non-mit library	16	4	6	7
from a colleague (or fellow student)	8	7	6	7
from your supervisor	5	10	4	6
from personal (or dept.) subscription	14	4	2	5
purchased from the publisher or a bookstore	4	1	8	5
other	1	1	8	5
from your instructor	0	3	2	2
from your co-author(s)	5	1	2	2
not sure how you obtained it	0	0	2	1
a research assistant obtained it for you	0	0	0	0
	100%	100%	100%	100%

If not found by respondent, reasons for lack of success in obtaining referenced work:	B&CS	MSE	Sloan	Total
not owned by the MIT Libraries	67%	50%	71%	64%
too recently published to be found in the MIT Libraries	33	0	14	14
not loaned-out, but unable to locate on shelves of MIT Libraries	0	50	0	14
already loaned-out to another library patron	0	0	14	7
	100%	100%	100%	100%

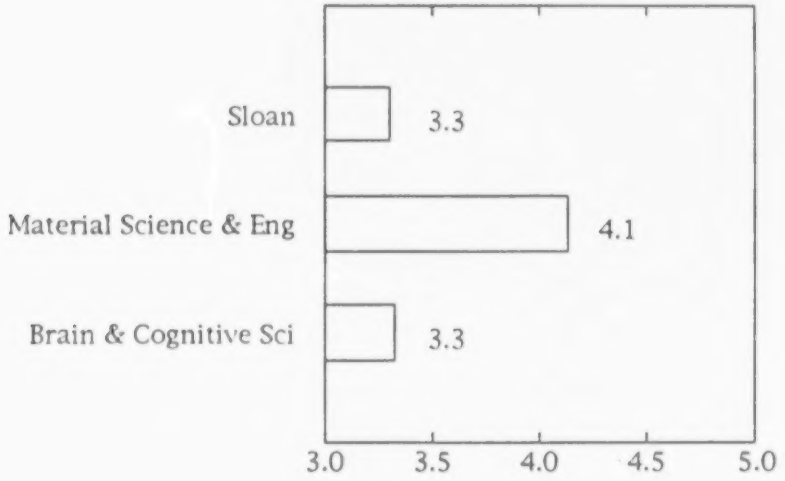
	B&CS	MSE	Sloan	Total
Percent of referenced works in which respondents' are personally acquainted with authors	31%	19%	15%	19%

Distribution of referenced works in which the respondents' are personally acquainted with authors where:	B&CS	MSE	Sloan	Total
respondent's colleague outside MIT is an author	57%	57%	32%	46%
respondent's (present or former) supervisor is an author	13	30	15	19
respondent's colleague at MIT is an author	13	9	21	15
respondent's friend or acquaintance is an author	13	4	12	10
respondent's (present or former) instructor is an author	4	0	9	5
other	0	0	12	5
respondent's (present or former) student is an author	0	0	0	0
	100%	100%	100%	100%

Respondent's evaluation of how important her/his knowledge of the referenced work is to the quality of own paper (scale: 1=not at all important; 7= very important): mean = 4.5 (s.d. = 1.6)



Respondent's evaluation of how much the value of her/his paper's contribution would be diminished if she/he had not been aware of the referenced work (scale: 1=not at all diminished; 7=greatly diminished): mean score = 3.6 (s.d. = 1.6)



Distribution of referenced works according to whether the respondent first became aware of it...	B&CS	MSE	Sloan	Total
during the <u>early</u> stages, while planning the research reported in your paper	30	38	42	39
during the <u>middle</u> stages, while undertaking the research reported in your paper	29	37	41	38
during the <u>later</u> stages, while writing your paper	41	25	17	23
	100%	100%	100%	100%

Highest academic degree completed by respondent or in progress:	B&CS	MSE	Sloan	Total
doctoral degree	74%	60%	28%	47%
master's degree	5	14	64	36
bachelor's degree	21	26	7	17
	100%	100%	100%	100%

Respondent's present status at MIT:	B&CS	MSE	Sloan	Total
graduate student	19%	58%	83%	62%
undergraduate student	12	25	6	14
post-doctoral associate or fellow	33	3	0	7
assistant professor	0	3	5	4
research scientist or engineer	17	2	0	4
full professor	5	3	3	3
associate professor	0	2	3	2
other	7	0	0	2
instructor or lecturer	2	2	0	1
visiting scholar	5	0	0	1
	100%	100%	100%	100%

Percent of respondents who hold an administrative post at MIT: 2%

Respondent's satisfaction her/her own ability to acquire the information to perform research (scale: 1=not at all satisfied; 7=ver satisfied): mean score 4.9 (s.d. = 1.5)